

Mobile Radio Technology

The journal of mobile communications technology

1990

- ▼ FCC Offices
- ▼ Product Directory
- ▼ Services Directory
- ▼ Trade Associations
- ▼ Company Addresses

BUYERS'
GUIDE





We'll give it to you straight

...with our new OMNI-LOC™ base

Angle adjustment in any direction without tools! Our new elevated-feed-point cellular antenna gives maximum performance, even in problem installations.



New OMNI-LOC™ angle-adjusting mechanism keeps mast vertical

OMNI-LOC™, an ingenious angle-adjusting mechanism, makes Model ASPD917 perfect for vehicles with sloping decks or angled trunk lids. Loosen the knurled angle locking nut, adjust the mast to vertical, and turn the nut to tighten.

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For added convenience, the one-piece stainless steel whip is removable and needs no cutting or tuning. We've even covered it with a tough black DURA-COAT™ finish for long life.

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Circle (1) on Fast Fact Card

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...with the C-516 six-line tone remote

Clear your desk...and control up to six base stations with only one standard telephone-size console! Vega's Model C-516 is the only small desktop tone remote that provides F1/F2/monitor/PTT control of up to six remote base stations. It operates over two-wire/four-wire lines and includes line-activity indicators and selected or summed receive audio.

The C-516 is only one of a wide variety of remote control consoles available from Vega. Check the following list for the console that fits your application:

Handset versions

- C-530 DC (single frequency)
- C-531 DC (two frequency)
- C-510C tone (two frequency)
- C-514B tone (four frequency)
- C-516 tone (six line, two frequency)
- C-581 tone (eight frequency)

Desk-mic versions

- C-532 DC (two frequency)
- C-511 tone (two frequency)
- C-540 tone (coming later...four frequency, 10 line)
- C-581/M tone (eight frequency)

Wall-mount versions

- C-533 DC (two frequency)
- C-512 tone (two frequency)

Custom versions

- Multiline/multifrequency
- Special mechanical configurations

Vega

a MARK IV company

9900 Baldwin Place
El Monte, California 91731-2204
Telephone: (818) 442-0782
Toll-free: 800-877-1771
FAX: (818) 444-1342

Circle (4) on Fast Fact Card

features

8 1990 Buyers' Guide

MRT's annual directory provides you essential information you will want to retain for quick reference year-round. Products and services are listed, as well as trade associations and FCC offices. You can find these sections as follows:

12 Product Directory

More than 110 categories of equipment are listed, as well as more than 750 suppliers. Advertisers in this issue are *listed in blue ink*.

86 Services Directory

Mobile radio services and companies that offer them are listed. Advertisers in this issue are *shown in blue ink*.

90 Company Addresses

An alphabetized index of suppliers and service providers appears in this section. Regional sales contacts are listed for advertisers in this issue.

132 FCC Offices Directory

Use this list to direct inquiries to government officials who regulate the land mobile radio industry, and to find the nearest field office that handles interference complaints.

133 Trade Associations Directory

Addresses and phone numbers for various mobile radio trade groups are provided for quick reference.

On the cover: MRT's third annual Buyers' Guide serves as a year-round reference for buying in 1990. It includes product and service categories, listings and company addresses.

134 Future technology unfolds at Telocator convention

Don Bishop

Telecommunications in the next decade, equipment innovations and a special dedication highlight Telocator's annual meeting.

departments

4 Editorial

Direct access is *the* issue to watch in 1990.

6 Letters to the editor

Readers tell us what they want: troubleshooting articles, new product information and fewer abbreviations, TNAF (to name a few).

136 People

Promotions at General Electric and Midland LMR.

137 Calendar

American SMR Network Association meets in San Antonio.

139 Classified ads

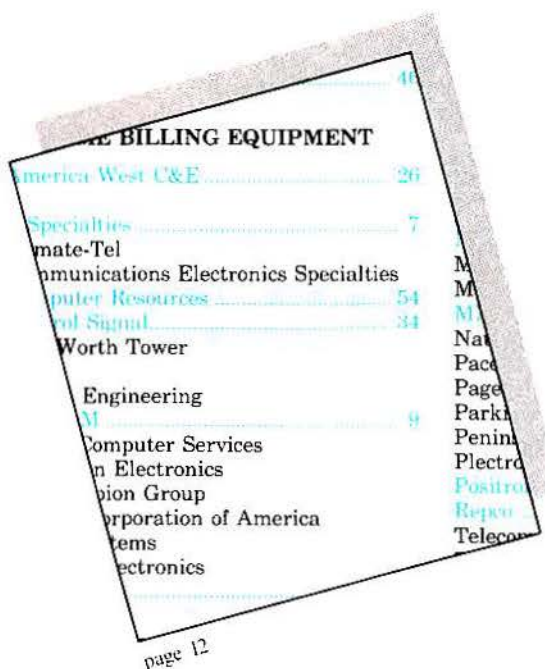
152 Ad index/hotline

Find advertisers quickly.

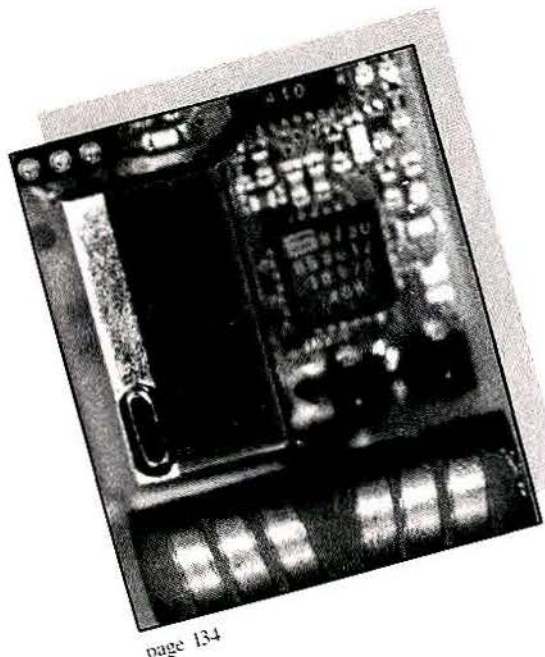
153 What do you think?

How do you use the Buyers' Guide?

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page 12



page 134



**New
DC or Tone
Remote
Control**

Wall mount

Higher profit margins, reliability you can count on, and fast delivery. That's SSC.

You win the bid. With a 50% markup.

To make it easier for you to maintain higher profit margins, we keep our prices extra competitive.

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Profits disappear quickly if you have to make several service calls—at your expense!

You'll be pleased with the reliability SSC delivers. It's backed up with a five-year limited warranty.

You get your order when you want it. Fast.

A recent survey showed there's a 90+ percent chance your order will be shipped within five working days of SSC's receipt of your order.

In any case, we'll give you a firm shipping date and we'll make it happen.

Full-line of signalling products.

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The new desktop or wall-mount remote control console pictured above is available in DC or tone, with a full range of features. You can field program it during installation to ensure system compatibility.

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You'll receive a complete package of information on signalling products designed to raise your profit margins. Contact Solid-State Communications, 21060 Corsair Blvd., Hayward, CA 94545.

SSC One source for all
your signalling needs.

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Call now for full information package:

800-227-1226 IN CA **800-227-0223**

Direct access



Users who buy two-way radio equipment focus on the economies and efficiencies radio communication offers. Frequency coordination and licensing command little attention, except initially as cost and delay items, and thereafter if interference occurs.

Frequency coordination costs escalated as much as 300% three years ago when the FCC gave user groups the sole duty to recommend the "best" radio channels. Congress set FCC license fees at about the same time.

Frequency coordination critics point to its monopoly aspect and poor government oversight as reasons why fees escalated. Some wage campaigns through petitions and publications to restore license availability without using a frequency coordinator. Others install radio systems without licensing them. Although the FCC responded by conducting two inquiries into coordinator business practices, it did not act to reduce fees.

Minority discontent, coupled with growing unlicensed radio use, spurred the FCC to issue a *Notice of Proposed Rulemaking* in PR Docket No. 88-548 to establish a "direct access" application process. Under the proposed rules, an applicant or his radio sales and service representative could submit an application directly to the FCC.

Look for these conflicts to appear in discussions of the proposal:

- Some frequency coordinators will object to having to comment on direct access applications for free. A sound comment must be based on an analysis

virtually as comprehensive as a full coordination, but without the revenue to offset the cost. Direct access supporters will cite pre-monopoly coordination days when coordinators commented on field study applications without suffering financial ruin. Field study applications were a previous form of direct access.

- Some frequency coordinators will question what will happen if direct access applicants fail to submit copies of their paperwork to the coordinators—falsely certifying to the FCC that they have—and thus obtain licenses without objection.

Direct access supporters will cite a previous investigation conducted by the FCC field operations bureau. The investigation found that similar field study application requirements generated a high level of compliance.

Direct access supporters will assert that potential radio users are more likely to place systems on the air without licenses than they are to perjure them-

selves on a federal document to obtain a license under false pretenses.

- Some frequency coordinators will point several flaws in the "monitoring option." Here is one example: Monitoring may produce some indication of interference that would be *received* by a proposed installation, but it may not indicate the interference that would be *caused* by a new installation.

Other points of conflict will be revealed as comments are filed with the FCC at the Dec. 1 deadline.

Some coordinators may see an opportunity to cut interservice sharing application processing time by filing their own direct access applications. Others may look to sell database listings of co-channel licensees to direct access applicants. Enabled to raid each other's turf, coordinators may compete with each other, not just with direct access specialists.

Direct access is *the* issue to watch in 1990.

—Don Bishop

Proposed direct access guidelines

- ☐ Applications will be accepted only for frequencies below 800MHz.
- ☐ Applicants will be required to list all co-channel licensees located within a 75-mile radius of all proposed stations or modified stations. The purpose of this requirement is to show that the applicant is fully aware of the communications environment in which it proposes to operate, and that the applicant has considered the operations of such co-channel licensees in developing its frequency request.
- ☐ Applicants will be required to provide a statement explaining why a particular frequency was chosen. This statement will be submitted in narrative form as a separate, clearly marked exhibit entitled, "Reason for Choosing Frequency."
- ☐ Applicants will be responsible for resolving post-licensing conflicts.
- ☐ Applications are to be filed with the commission; copies of applications and all accompanying exhibits must be provided to the appropriate frequency coordinator simultaneously. Coordinator objections are to be filed with the private radio bureau within a 30-day notice period. Failure of a coordinator to object within the prescribed time limit would be construed as concurrence with the frequency selected.

The commission also has proposed monitoring as an alternative. Any applicant using monitoring to select a frequency must do so at a location as close to the proposed system's base station transmitter site as possible, with a receiver antenna that reasonably parallels the operating parameters of the proposed system. The monitoring must be done for a minimum of four business days, over a two-week period.

PRIVACY

Volume 1, No. 4

NEWS
from
transcript

NEW TECHNOLOGY FOR TODAY'S RADIOS

Nobody does it better

VOICE PRIVACY

Whether you need four codes or four billion, Transcript has the reliable system for your radios.

Now with advanced features like ANI, Status reporting and Selective Calling, Transcript's CVP™ is unmatched by any other system.

Specified and depended on by major users and governments world wide.



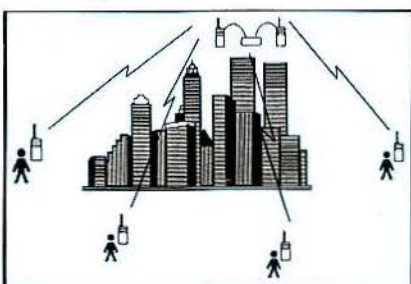
Transcript's voice privacy modules go to work every day in over 400 different makes and models of radio.

Instant Repeater

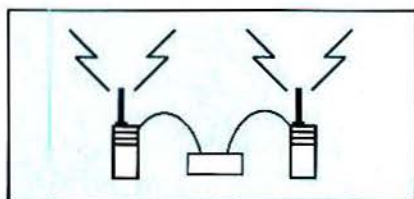
Whether fighting forest fires in the Northwest or providing emergency communications after a hurricane, Transcript's remarkable TransPeater™ goes to work faster than any other system.

Using programmable radios, simply connect the TransPeater™ between any two units (portable, base or mobile) using existing micro-

phone/speaker connections.



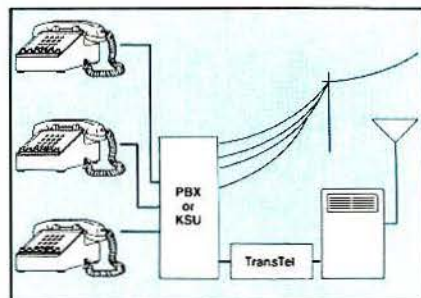
Transcript's TransPeater™ provides instant repeater service



Transcript's TransPeater™ easily connects two radios as a repeater

Unique Remote

Control a base station using your existing telephone system. A single TransTel™ replaces costly remotes and permits control of the base from any telephone extension. (DTMF required)



Transcript's TransTel™ replaces remotes

Bendix/King Users

Special upgrades for KING portables in VHF & UHF. Plug in options for unit to unit selective calling, voice privacy and more. Also a new low cost 28 channel conversion for the VHF LPH series.



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1620 North 20th Street, Lincoln, NE 68503

Fast Fact Card comments:

MRT has a good mix of general and technical articles.

The toughest problems to be solved on the job are:

- (1) waiting for channel access in high-usage periods.
- (2) interference on the channel from other users that are 60 miles to 90 miles away.

Edward Bermann
Brookfield Fire Department
Brookfield, IL

I would like to recommend one or two articles more in each issue on troubleshooting or reader assistance-type articles.

In the March issue, the most interesting article was "Technical Considerations For Vehicular Fiber Optic Links" by John Freed.

The two toughest problems facing me on the job are:

- the vast assortment of communica-

tions means—microwave, including 2GHz and 8GHz; VHF mobiles and repeaters; UHF datalinks; and power line carrier equipment.

- the need to keep abreast of new technology.

James Brand
Western Area Power Administration
Gering, NE

I read all your issues from cover to cover. The issue I took this card from, April 1989, is superb.

The most interesting articles in the issue are "Why Tower Amps Improve Reception" by Ernest N. Mann, Mannbros Technologies, and "Installing Mobile Radios: Tips From The Field" by R. Scott Gilmore, Saginaw County, MI.

As a newcomer to the field, I find the toughest problem is finding articles and literature written from a perspective that does not assume the reader already

knows all the basics—and more. A particular problem is the abbreviations.

Lynn D. Shepperd
Progressive Electric
Nancy, KY

The toughest problems to solve are intermodulation interference in large cities; operator training; and premature nicad battery failure.

Albert Pione
Technician
Maritrans
Philadelphia

All editions of MRT are of vital interest to me. I use the magazine to keep abreast of new products and new technology, and as a buyers' guide.

Jim R. Schwiesow
Sioux County Communications
Orange City, IA



Mobile Radio Technology

The journal of mobile
communications technology

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Line

Enhance Your Existing Two-Way System with...

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DTMF Microphones



Front Panel Mount
DTMF Encoders



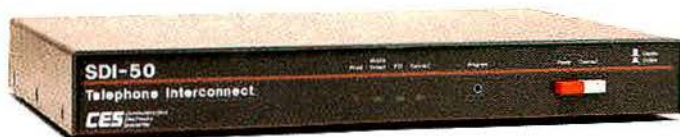
800/860
DTMF Mobile
Handsets



RM-10CA
Repeater Maker



510SA
Simplex Patch



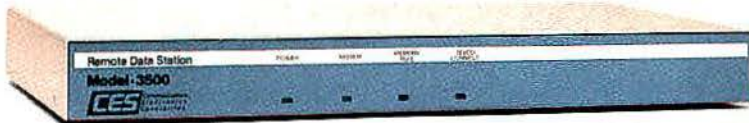
SDI-50 Simplex/
Duplex Interconnect



ACI-35 Simplex Vox
Control Station Interconnect



5200 Community
System Interconnect



3500 Remote Data
Storage Station



DID-50 DID Selector
Level Interface

BUYERS' GUIDE



1990 Buyers' Guide

MRT's annual directory provides you pertinent information you will want to retain for quick reference year-round. Products and services are listed, as well as trade associations and FCC offices.

By MRT editorial staff

Welcome to the third annual directory issue of *Mobile Radio Technology*. We believe you will find it a complete product and services source for the mobile radio industry.

We have worked for months with cooperative industry authorities and our editorial advisory board to establish informative categories and to compile data. We mailed questionnaires to suppliers and service companies, and we asked them to list the products and services they offer. This "Buyers' Guide" is designed to be an easily used reference for an entire year. It is divided into five sections: the **Product Directory**, the **Services Directory**, **Company Addresses**, **Trade Associations** and **FCC Offices**.

The **Product Directory** lists more than 110 categories of equipment and suppliers. Under each heading is a complete list of the companies that have that particular product available. More than 750 companies are listed.

Under the product headings, you will find *companies listed in blue*. These companies are advertisers in

this issue, and the page location serves as a direct reference for additional information directly from the manufacturers, either by contacting them or using the Fast Fact number assigned to the ads and returning the Fast Fact Card bound in the back of this issue. (See page 155.)

The **Services Directory** follows the Product Directory and lists 12 services categories and the companies that provide them. Here again, you will find *blue listings for advertisers* in this issue.

Following the product and services directories, you will find an alphabetized index of **Company Addresses**, as well as phone numbers for convenience, for all the companies listed in this "Buyers' Guide." Regional sales contacts are listed for advertisers in this issue.

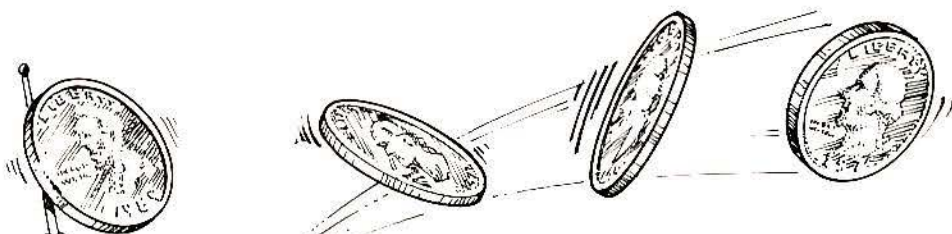
As part of our directory, *MRT* sorts out the various trade groups in mobile radio in our **Trade Associations** listing. Here you will find the addresses and phone numbers of the numerous trade associations representing mobile radio interests.

FCC Offices are listed for your con-

venience following industry associations listings.

For your convenience, two Fast Fact Cards are bound into this issue. Each card is valid for a full year. By circling the appropriate numbers associated with manufacturers' and services companies' advertisements, you can obtain additional information directly from the product or service source.

The editorial staff has made every attempt to make this "Buyers' Guide" an accurate and comprehensive listing of suppliers and services companies in the mobile radio field. Nevertheless, because of the number of suppliers in this field and new entrants always are surfacing in this industry, some companies or organizations and products or services may have been overlooked. If you are one of these companies or organizations, please send your company's name and address during the upcoming year to Pat Blanton, *MRT* Directory Editor, P. O. Box 12901, Overland Park, KS 66212. This will help make the "Buyers' Guide" an even better reference.



Plug In More Repeater Profits

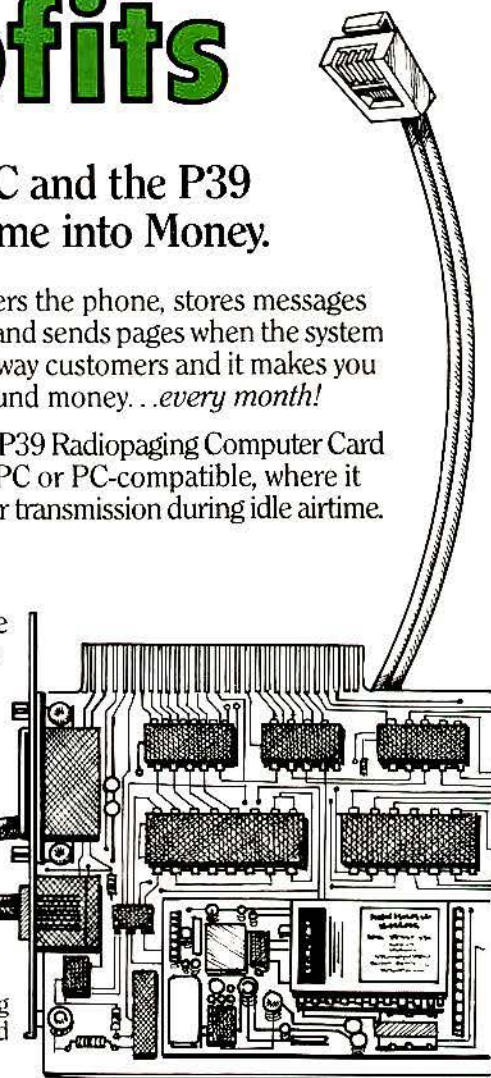
A Phone, a PC and the P39
Turn Idle Airtime into Money.

Automatic overlay paging answers the phone, stores messages while your 2-way system is busy, and sends pages when the system is idle. It doesn't step on your 2-way customers and it makes you money selling pages. It's like found money. *...every month!*

It's as simple as plugging our MX P39 Radiopaging Computer Card into an option slot of any IBM® PC or PC-compatible, where it stores voice and data messages for transmission during idle airtime.

To plug in an MX P39 and more
repeater profits, Call Toll Free:
1-800-638-5577

MX P39 Radiopaging
Computer Card



MX • COM, INC.

4800 Bethania Station Road, Winston-Salem, NC 27105-1201

In North Carolina Call: (919) 744-5050 or FAX (919) 744-5054

In Canada Call: Omni • East/514-648-8432 • Central/416-841-6740 • West/403-291-9639

IBM/Reg. TM International Business Machines Corp.

Circle (8) on Fast Fact Card

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For more information on the products and services **listed in blue** on the following pages, turn to the page listed with the entry to find the company's advertisement. Note the Fast Fact number assigned to the advertisement, and circle this number on the Fast Fact Card found on page 155 in this issue and return the card to **MRT**. See example below. The cards are valid for one year.

Mobile Radio Technology

For information June 15, 1989 01/19/89 Dec 1, 1989

Name: _____

Address: _____

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THE "A" TEAM HAS ARRIVED!

The new 2955A and 2957A radio comms test sets.

From the company that developed the world's most popular radio communications test set comes the **2955A**. It looks the same. It costs the same. It operates the same, **but inside are new features:**

- Digital Coded Squelch encode and decode
- DTMF encode and decode
- POCSAG pager testing, including alphanumeric
- Up to 33 tone sequences
- Waveform generator with Sine, Square, Sawtooth and Triangle waveforms
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- +5dBm Signal Generator output level
- And more...

The two enhanced, independent, audio generators, along with digital modulation capability, make this test set a real powerhouse when evaluating FSK NRZ digital tone systems.

For the testing needs of the cellular industry, the **2957A** continues to offer the diagnostic power of an engineering work station while retaining user friendly, pushbutton operation for entry level technicians in the service shop.

Don't forget the most comprehensive CRT display available. Only the **2957A** leaves no doubt about interrelated measurements. You view both the transmitter and receiver results simultaneously. **2957A** improvements include:

- Revert to DC power supply
- Improvements in the bus structure with additional tests available.

For example, data and ST deviation measurements along with hook flash results and ST duration (timing) information, are included as standard test routines available to bus users.

What is the *real* bottom line? A *proven* cellular test set that continues to grow to meet the expanding needs of the industry.

For users who need to test cellular or trunking radios with protocols of an international structure, the new **Model 2960** offers the ability to select from up to six internally installed standards that include:

- AMPS, TACS, NMT, and RC2000 Cellular formats (variants also available).
- Band III Trunking protocol

For further details on the above products, or to join the Marconi Users Group (MUG), contact your local Marconi Representative or call direct (800) 233-2955; Fax: (201) 934-9229 or write: Marconi Instruments, Inc. 3 Pearl Court Allendale, NJ 07401 • (201) 934-9050

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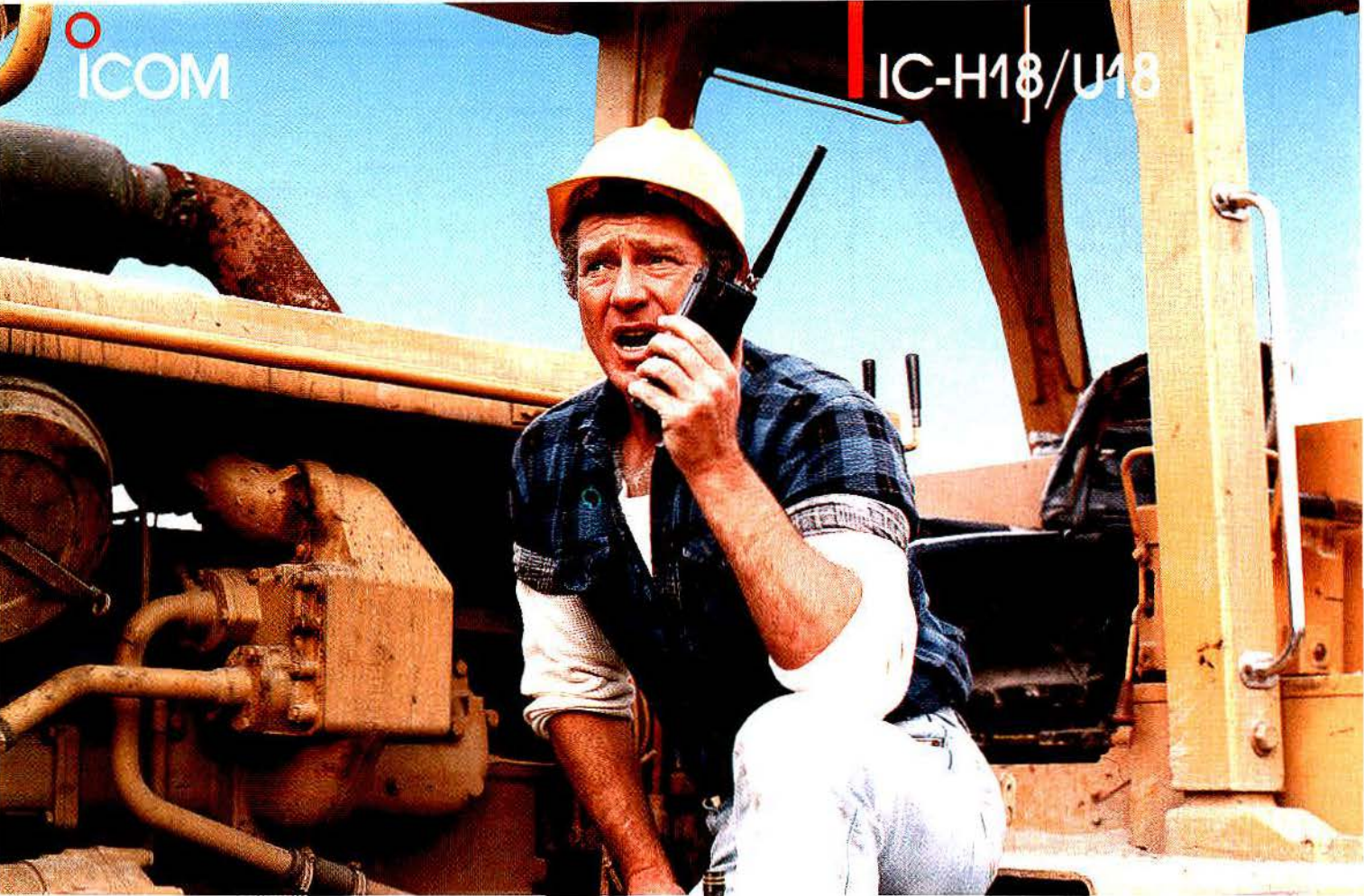
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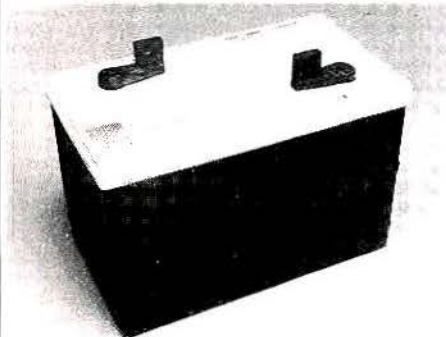
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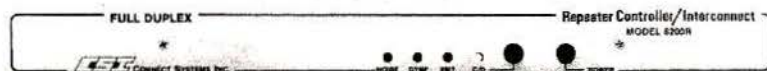
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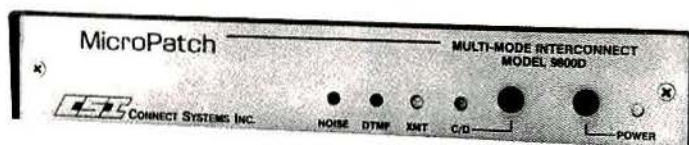
USER SELECTABLE MODES:

- Full Duplex
- Regular Half Duplex
- Privacy Half Duplex
- Repeater Controller
- Dial-Up Remote Base
- Dial Access Paging/Selective Calling

OPTIONS:

- 50 User ANI Validation (prog. over the air)
- 1000 Call Two Tone
- 1000 Call 5/6 Tone
- 38 Call CTCSS
- CTCSS Control Board
- AUX Relay

MODEL 9800 SIMPLEX/SEMI-DUPLEX



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USER SELECTABLE MODES:

- VOX Control Station Patch
- Sampling Patch (VOX enhanced)
- Semi Duplex Patch
- Repeater Controller
- Dial-up Remote Base
- Dial Access Paging/Selective Calling

OPTIONS:

- 1000 Call Two-Tone
- 1000 Call 5/6 Tone
- 38 Call CTCSS
- CTCSS Control Board
- Electronic Voice Delay
- AUX Relay

THINGS TO LOOK FOR IN A PATCH:

Standard Features: (both models)

- Built-in user programming keyboard & display
- User programmable CW ID
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- * up # down or multi-digit
- Secret toll override code
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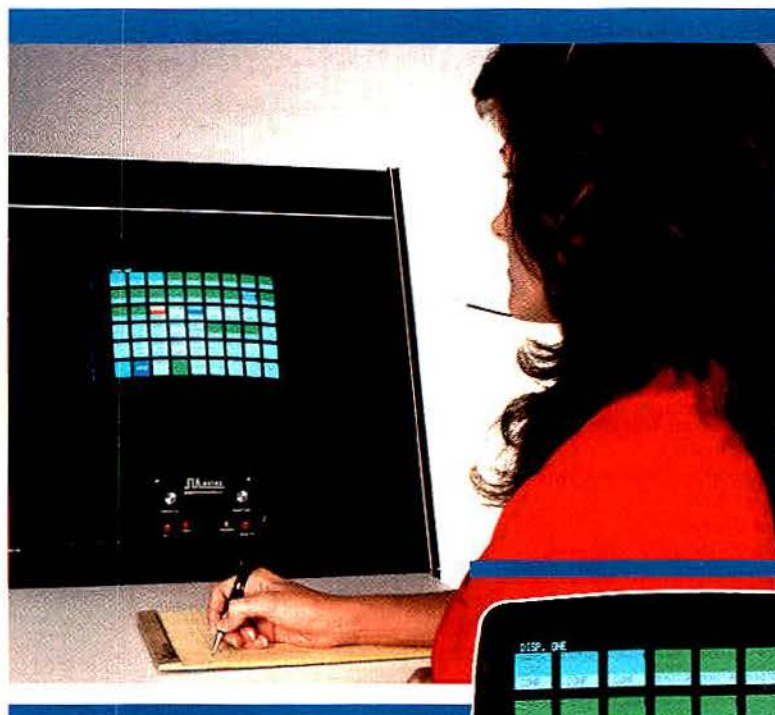
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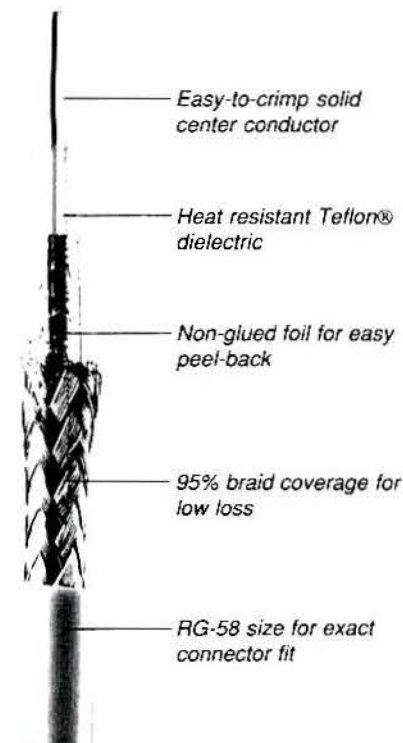
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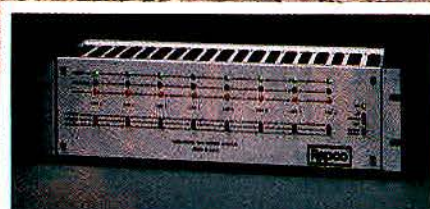


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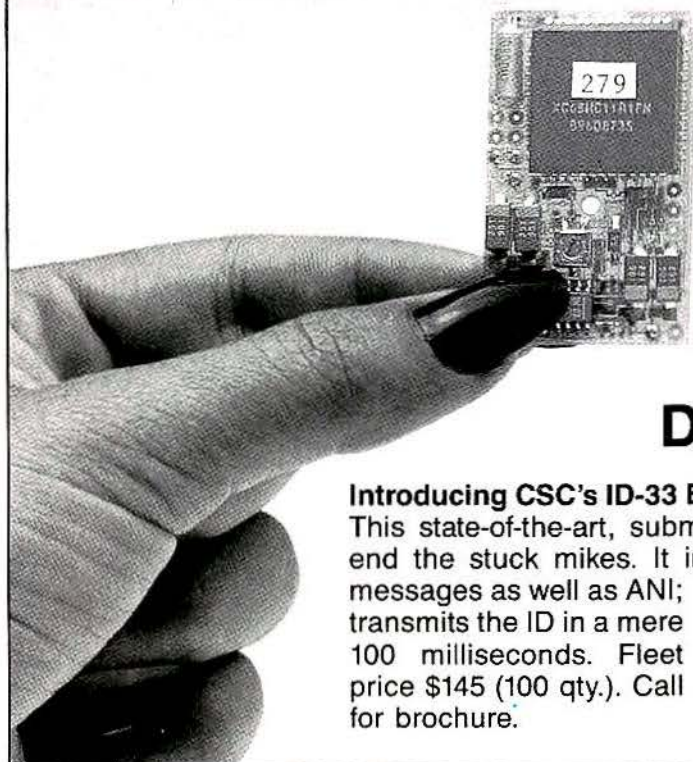
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DATA TRANSMISSION EQUIPMENT

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 Advanced Electronic Applications
 AEG Bayly
 Alcom Electronics Exchange
 Apogee
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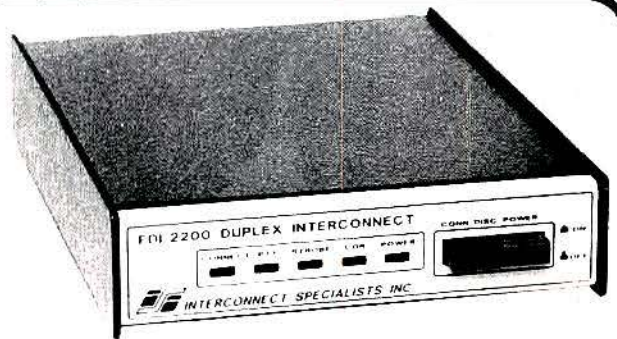
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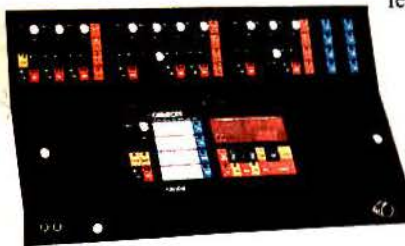
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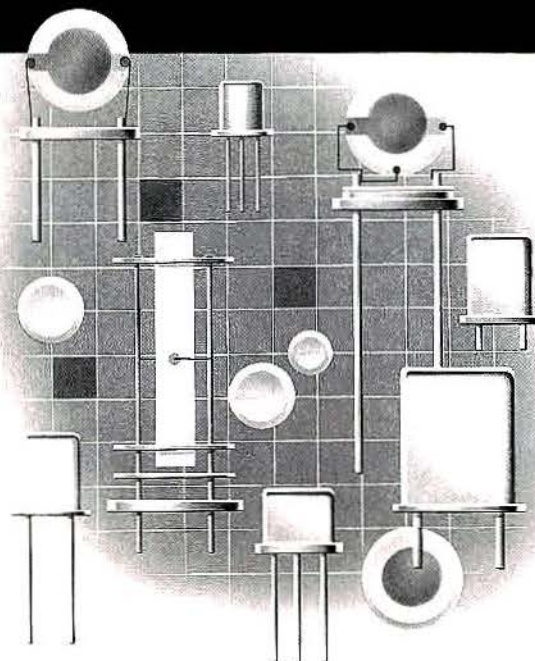
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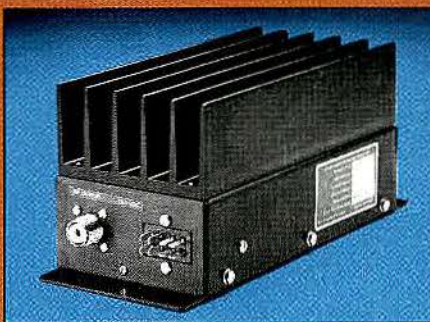
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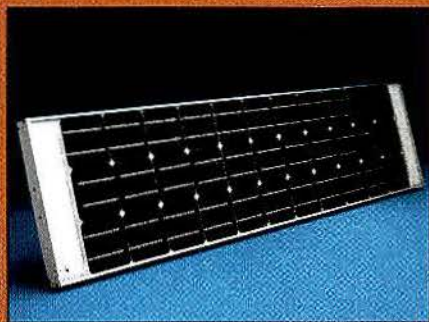
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Wildcat Electronics
Wiltron
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Cellular Solutions

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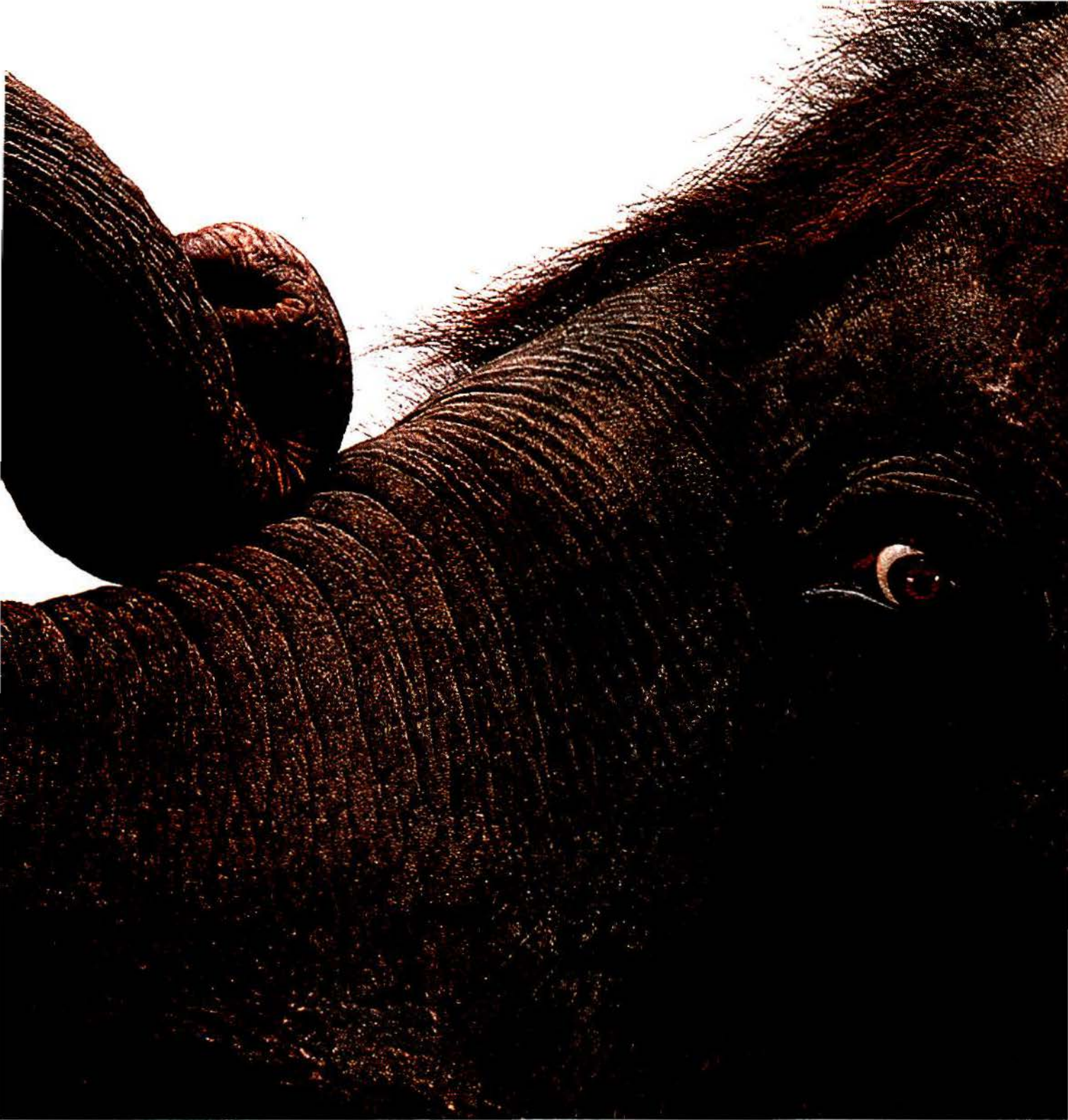
CL-400	Log-Periodic (8 dBd) Broadband 400-512 MHz	\$ 370
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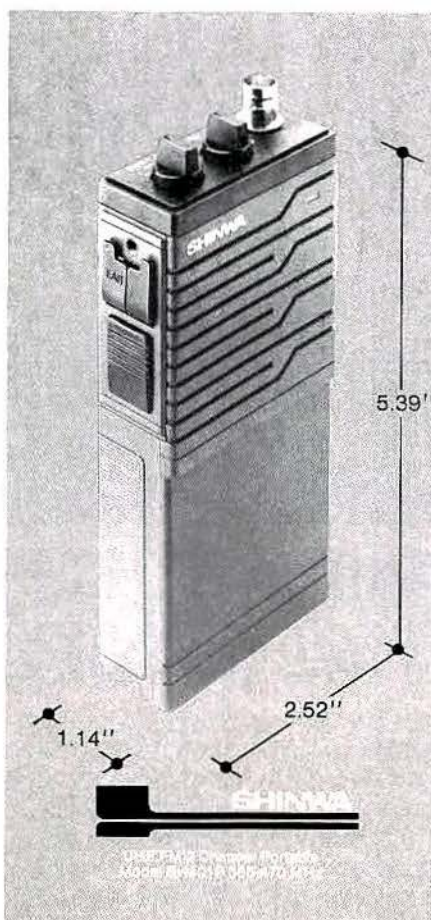
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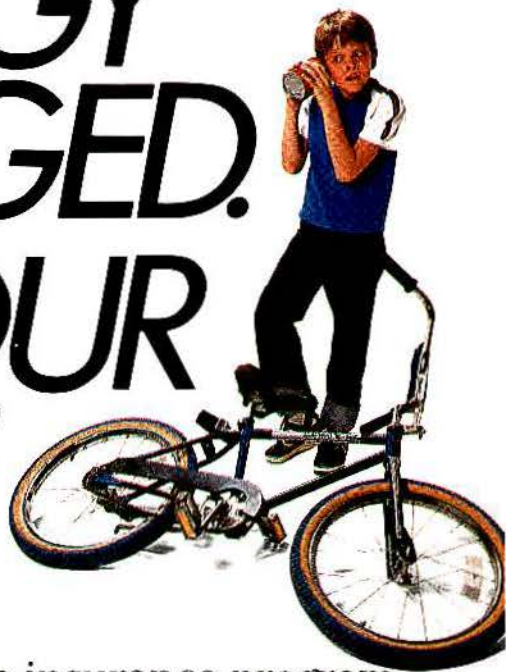
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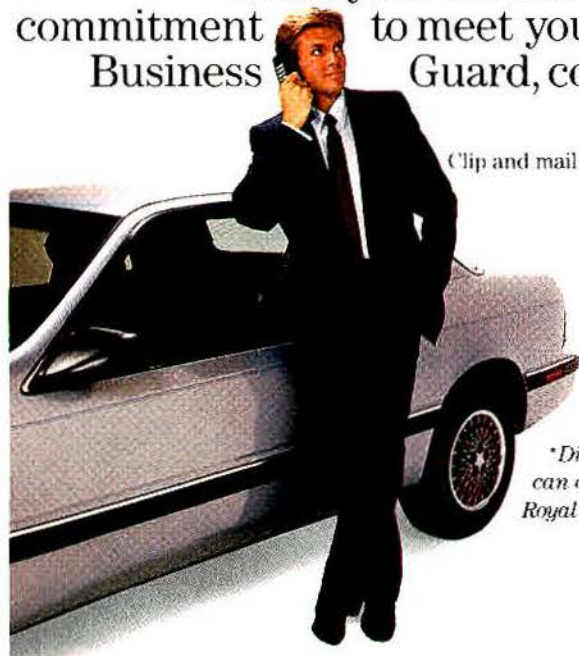
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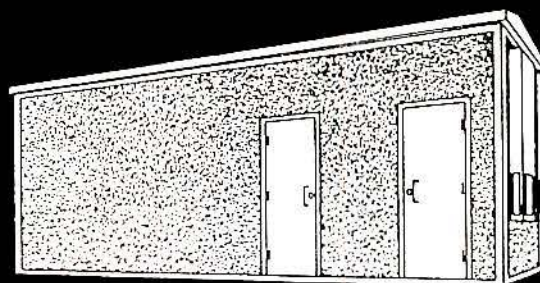
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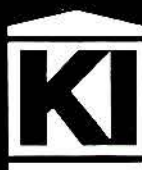
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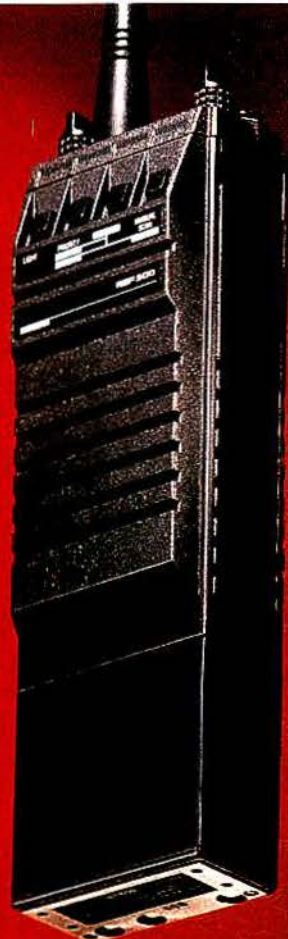
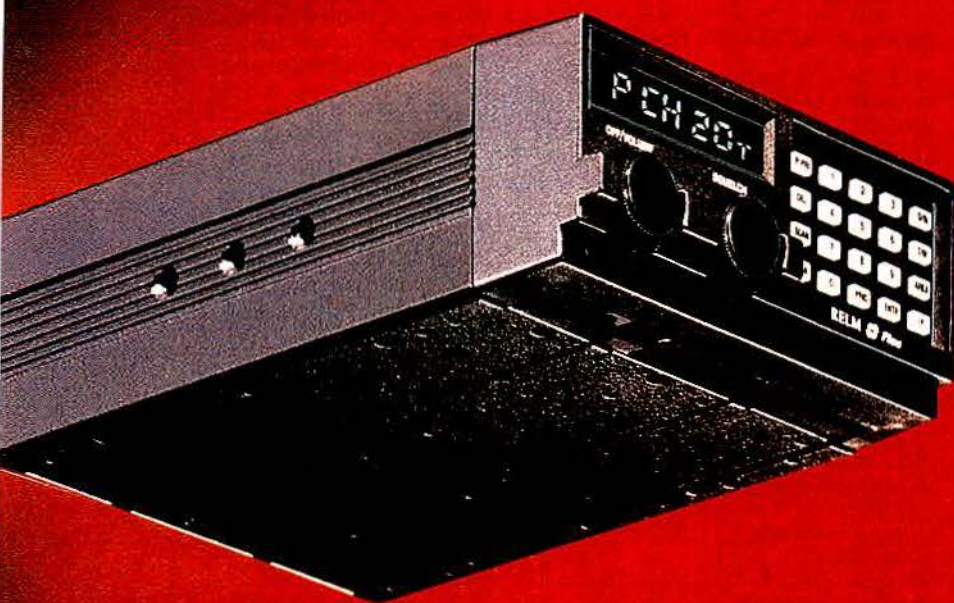
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DCS is compatible with DPL, a trademark of Motorola, Inc.

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The RSP500 features a unique alpha-numeric reversing display so you will always be able to read it right side up no matter how it is being used. In normal operation, the RSP500 reads from the front. When belt mounted with the optional remote speaker/mic, the display reverses itself so even though the radio is facing away from you, the display is still readable.

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Commtron
The Jack Daniel Company
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METS
Mobile Data International
Modems Plus

MX-COM 9

National Car Phones
Nav-Com
Neulink, Div. of Celltronic
Qwint Data
Sigtec Pty.
Syntonic
Technical Marketing

Teletec
Texas Instruments, Data Systems Group
Uniden Corporation of America
Webster Communications
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MOBILE SATELLITE EQUIPMENT**AAT Communications** 124

Advanced Electronic Applications
American Terminal Supply
Cetacea Sound
Hirschmann of America
Nav-Com
Qwint Data
Raven Electronics 106
TTI, A Unit of General Signal
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**MOBILE TELEPHONE EQUIPMENT,
NON-CELLULAR****Mobile and Portable Telephones**

AAT Communications
Advanced Cellular Philadelphia
Air Comm
Argus Electronics
Beam Radio
Branco 120
Business Wholesale
Canadian Marconi
Cellular Depot
Cellular Wholesalers

Colorado-Hi-Tek**Communications Associates** 20

The Communications Center
Communications Electronics Specialties
Communications Equipment Brokers
Communications Signalling

Data Signal 96**D&L Communications** 72

Evans & Evans Associates,
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Freeman Engineering Associates 41

General Electric, Mobile Communications
Business

Glenayre Electronics

GRE-America

Great Lakes Communications Sales

Hill Radio Communications

E. F. Johnson 43

Kryptic

Lucas Industries

Midland Land Mobile Radio

Mobile Installers Products

Motorola, Communications Sector

Mountain Communications

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Repeo 33

Company Addresses begin on page 90

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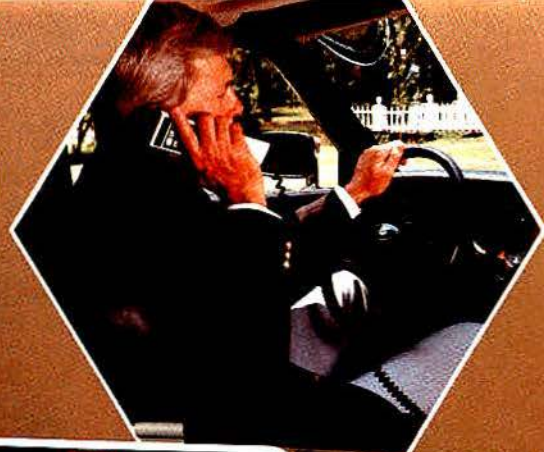
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**Per AMPS-May, 1983 specifications



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Systems Equipment

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 CadCom TeleSystems
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 Cellular Wholesalers
 Communication Engineers
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 General Electric, Mobile Communications Business
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 Glenayre Electronics, Quincy Operation
 Great Lakes Communications Sales
 Doug Hall Electronics 107
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 Kryptic
 Manon Engineering
 Motorola, Communications Sector
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 VSI Telecommunications
 Wildcat Electronics

MODEMS, RF

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TK-320 Ultra-Compact 25 Watt UHF Portable

TK-230 5 Watt VHF Portable with KSC-4 Rapid Charger

Additional Models Available

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Great Lakes Communications Sales
IDA
E. F. Johnson 43
Kantronics
Lunar Industries
Maxon Electronics 79
Meridian Communications
Microwave Data Systems
Mobicom
Monicor
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MX-COM 9
National Car Phones
Neulink, Div. of Celltronics
Neutec, Div. of Celltronics
NovAtel Communications
Nu-Way Marketing
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Pace Electronics, Div. TeleMobile
The Parts Connection
Quality Telecom Supply 115, 123, 126
Qwint Data
Repeco 33
Ritron 73
Secom Systems
Solid-State Electronics
Spectrum Communications
TEDI
Telemobile
Tele-Path
Teletec
Trans Com
Transcrypt International 5

Uniden Corporation of America
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MODULATION DEVIATION METERS — See SERVICE MONITORS

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Cellular Depot
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Decibel Products 132
Dixie Communications
D&L Communications 72
D&R Associates
Electronic Products
Gamber-Johnson 137
M. Hutton & Company 84
IDA
Jon/Beau
Meridian Communications
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Motorola, Communications Sector
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The Parts Connection

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GLB Electronics 58
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ICOM America 15
 Kantronics
 Lunar Industries
Maxon Electronics 79
 MFJ Enterprises
 Monicor
 Motorola, Communications Sector
MX-COM 11
 Neulink, Div. of Celltronics
 Neutec, Div. of Celltronics
 Pac Comm Wireless Data Systems
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 Neutec, Div. of Celltronics
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 Paramount Communication Electronics
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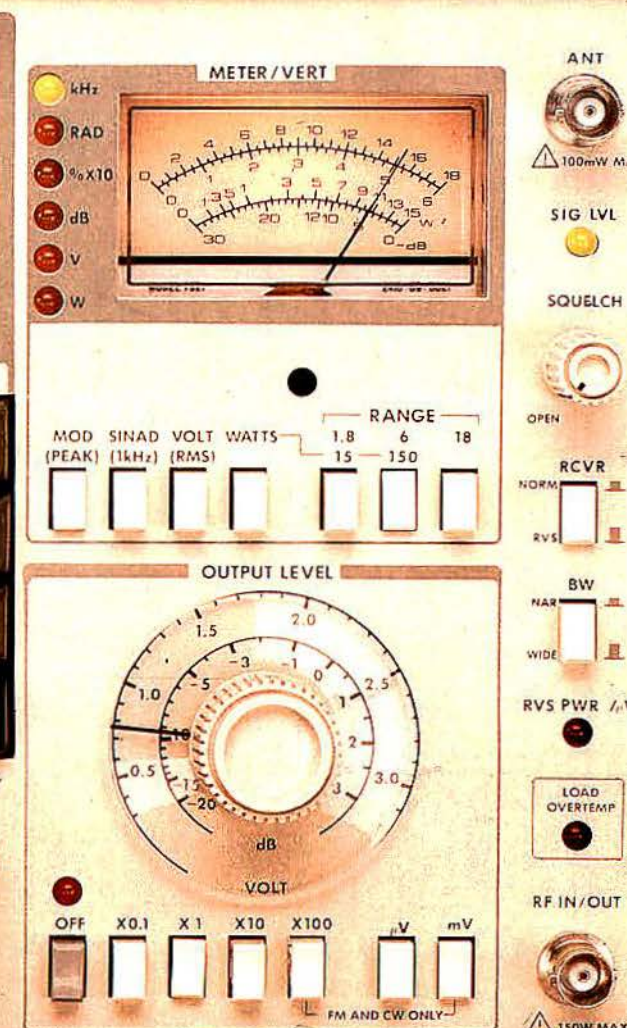
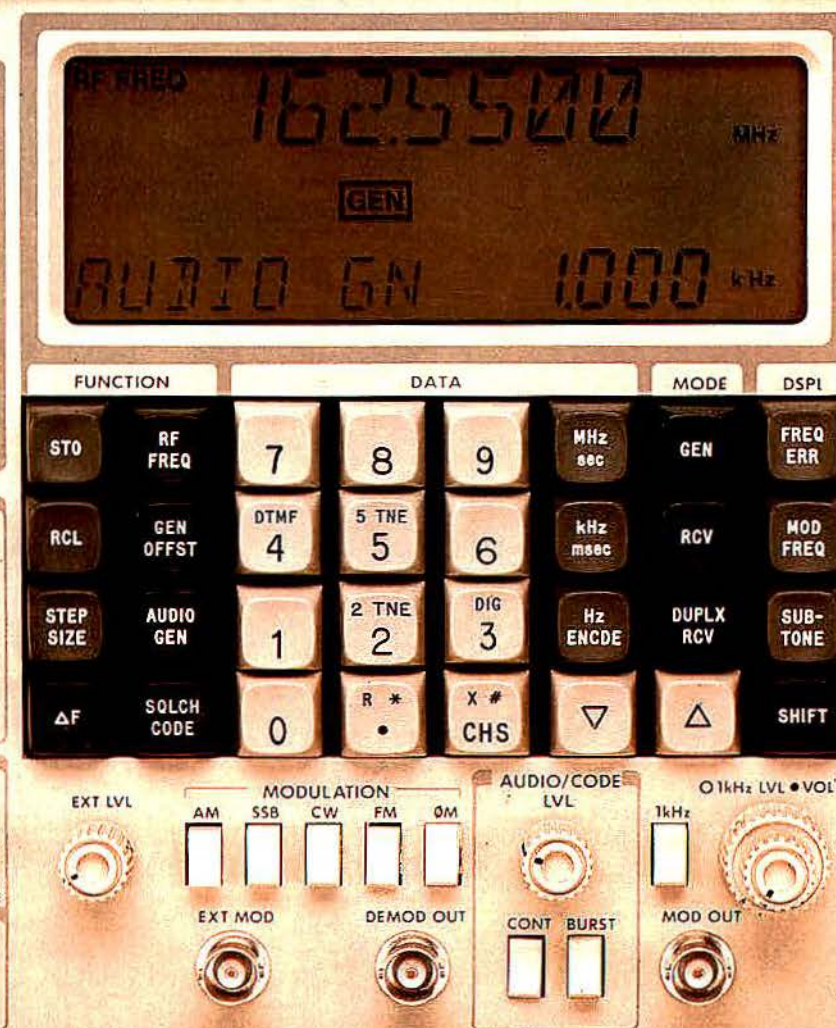
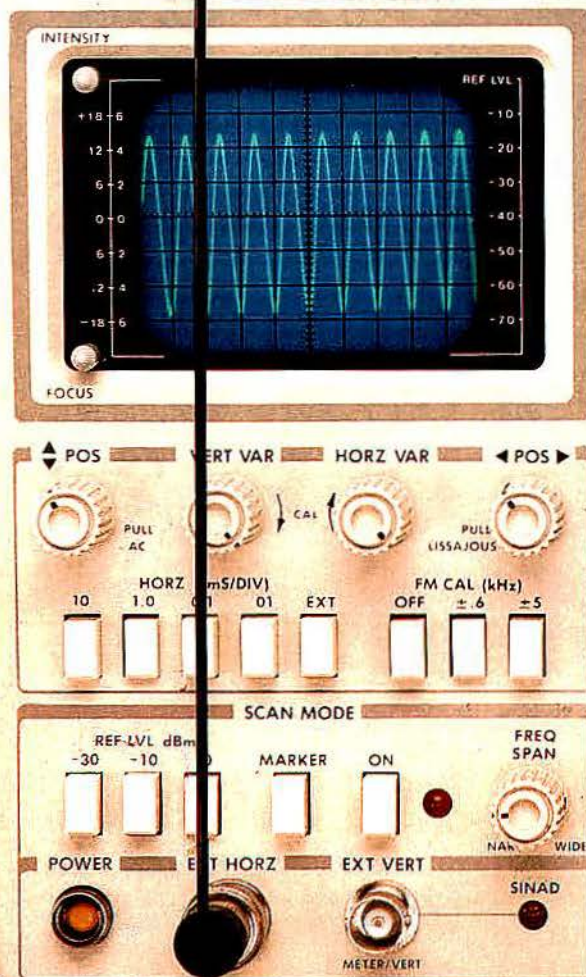
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The solution to most interference, intermod, and desense problems in repeater systems.



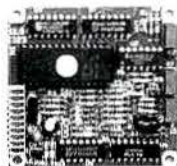
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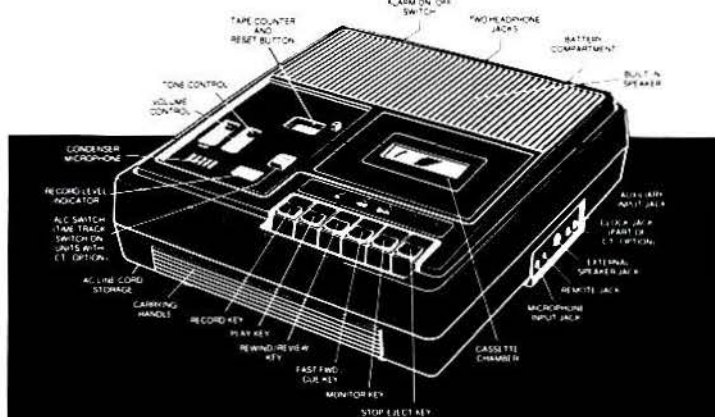
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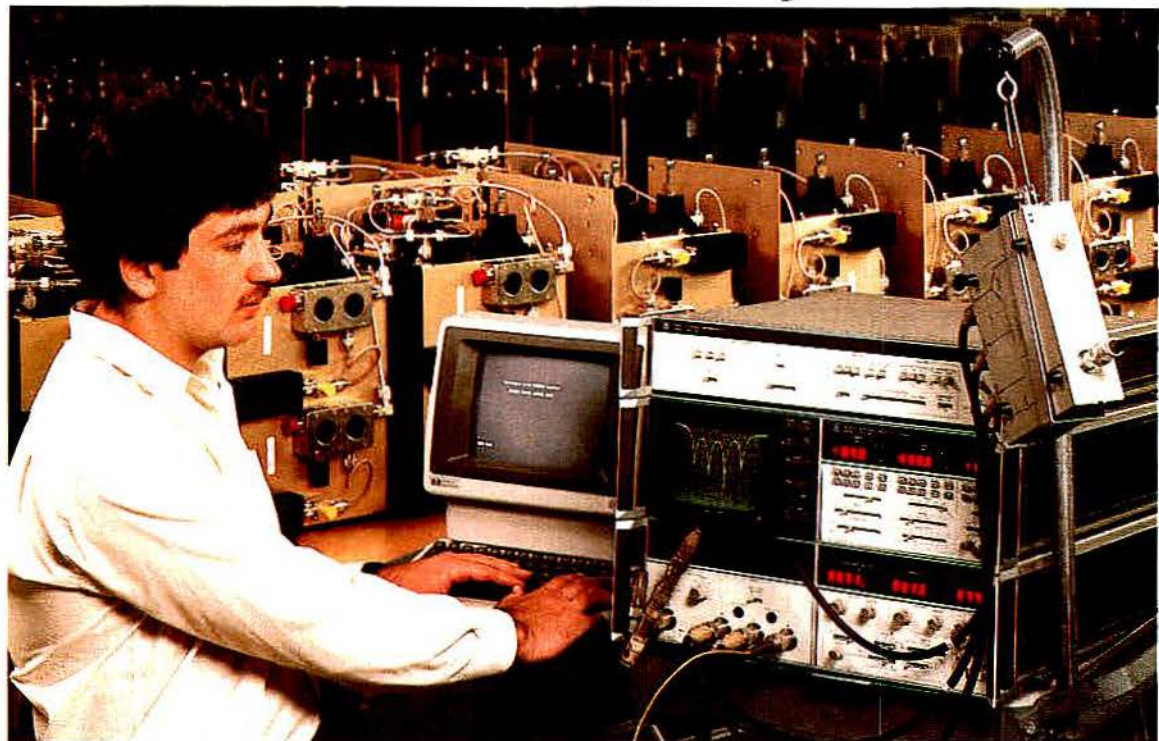
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It's the same impulse that causes us to make our own fiberglass for radomes, to test omnidirectional cellular antennas in an anechoic chamber, to run electrical checks on *every* antenna.

If you're quality-conscious, consider combiners and receiver multicouplers. Everyone tests them some way. Only CELWAVE gives you their report cards.

For more information, call or write CELWAVE, Route 79, Marlboro, NJ 07746. Toll free 1-800-321-4700.

CELWAVE

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 Manon Engineering
 Maxon Electronics 79
 Maxon Paging Products
 Microlink
 Motorola, Communications Sector
 MX.COM 9
 Neutec, Div. of Celltronics
 Nu-Way Marketing
 PageTek
 The Parts Connection
 Reach Electronics 24
 SCE (Spectrum Communications
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 Shinwa Communications of
 America 44
 Shinwa Tsushinki
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 Great Lakes Communications Sales
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 Motorola, Communications Sector
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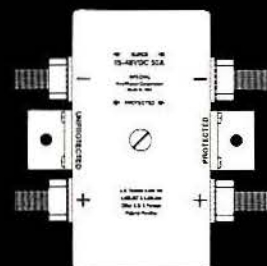
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PARTS

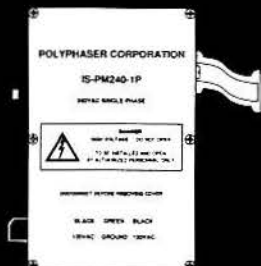
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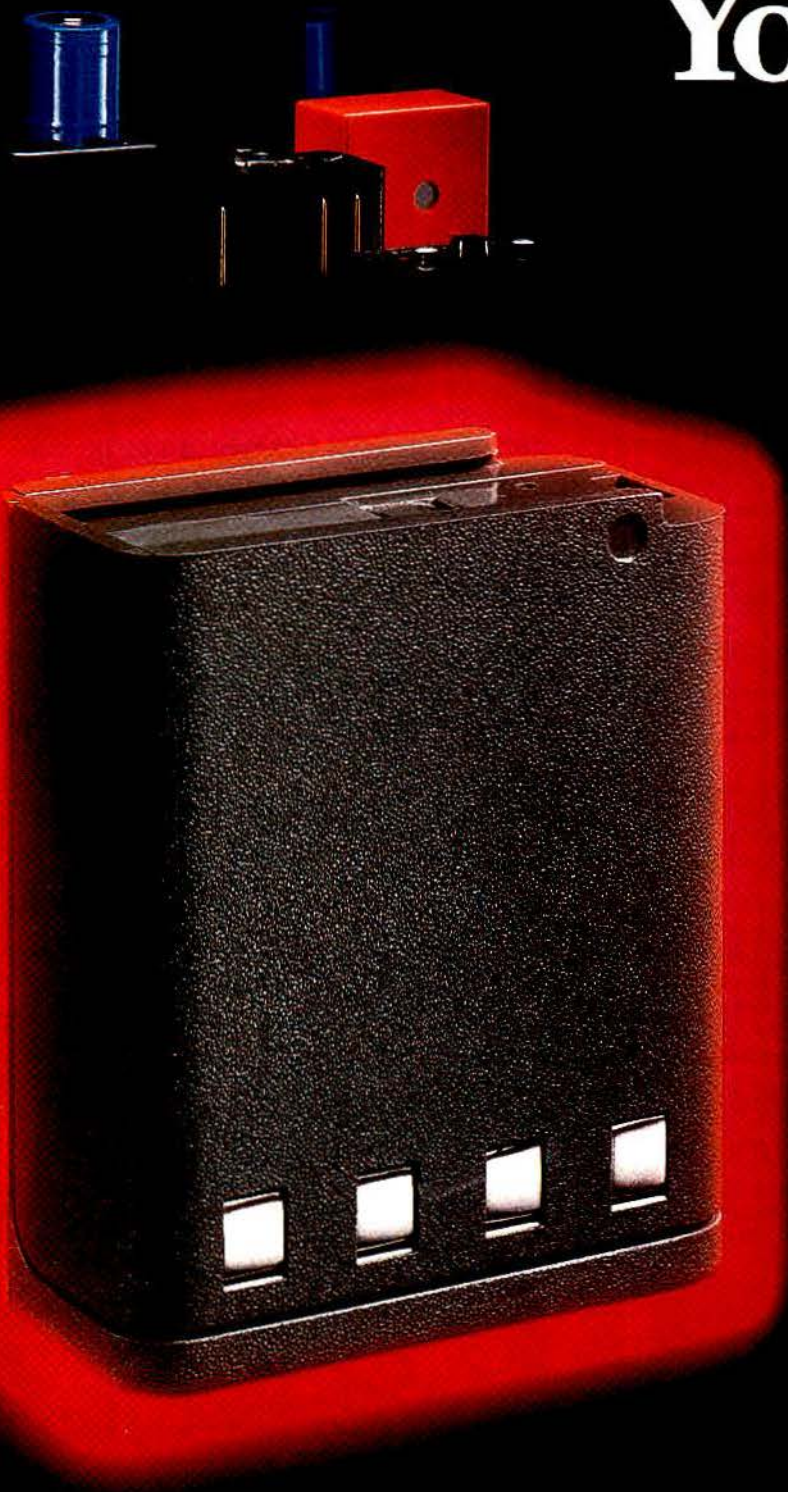
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We offer a complete line of batteries and battery packs for virtually every communications power requirement, from portable radios to cordless telephones — even customized equipment.

For the name of our distributor nearest you, or for emergency orders, call toll-free 1-800-228-4563. Or FAX us direct, toll-free, at 1-800-848-DUCK.

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GSA Contract No. GS07F19091.



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INTERNATIONAL, INC.

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Spectrum Communications
Tele-Path
VCPI International 60
Wisco International

POWER SUPPLIES

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Adams Distributing
Air Comm
Alpha Technologies
Anixter Bros.
The Antenna Farm
Argus Electronics
Astron 85
Beam Radio
B&K Precision/Maxtec International
Brunelle Instruments
CadCom TeleSystems
Cartwright Communications
Cellular Wholesalers
Communications Associates 20
Communications Equipment Brokers
Contact East
C&S Sales
Decibel Products 132
Dixie Communications
Electronic Products
General Electric, Business Information
Center
Glenayre Electronics
Great Lakes Communications Sales
Helper Instruments 121, 126, 134
Hewlett-Packard
Hill Radio Communications
M. Hutton & Company 84
ICOM America 15
E. F. Johnson 43
La Marche
Lancer Electronics
Leader Instruments
Lectronic Research Labs
Lexington Communications
Manon Engineering
Meridian Communications
Midland Land Mobile Radio
Mobicom
Motorola, Communications Sector
Neutec, Div. of Celltronic
Newmar 128
Nu-Way Marketing
Parkinson Electronics
The Parts Connection
Photocomm Industrial Div.
Power Conversion Products 135
Powerline 97
Primus Electronics 87
Pulstar Distributing
Radio Barn
Ritz Electronics (RELCO)
Secom Systems
Sinclair Radio Labs-Canada
Solar SignAge
Spectrum Communications
Syntec Communications Systems
TEDI
Tele-Path
Tessco
TPL Communications 92
Trilectric
Two/Comm
Uniden Corporation of America

U.S. Power Converting
VDO-PAK
VDO Products 94
Webster Communications
Whelen Engineering
Wilmore Electronics 115
Wisco International
C.W. Wolfe Communications

PRESELECTORS --See ANTENNA SITE EQUIPMENT

PROGRAMMERS, NAM, PROM AND OTHERS

BYTEK Instrument Systems Div. 134
Cellular Depot
Cellular Product Distributors
Cellular Wholesalers
Cetacea Sound
Communications Associates 20
Contact East
Curtis Electro Devices 121
General Electric, Mobile Communications
Business 107
Haewa 107
M. Hutton & Company 84
Kenwood USA 53
Lancer Electronics
Meridian Communications
Midland Land Mobile Radio
The Parts Connection
TEC Cellular Antenna
Tessco 25
Two/Comm

PUBLIC ADDRESS EQUIPMENT

AAT Communications
Atlas/Soundolier
Canadian Marconi
Elenex
Evans & Evans Associates,
Communications Consultants
Fanon Courier
General Electric, Business Information
Center
M. Hutton & Company 84
Multi-Media Communications
Pulstar Distributing
Secom Systems
Shure Brothers 80, 103
Solid State Communications 3
Speco Components
Tessco 25
Whelen Engineering

RACKS, EQUIPMENT

AAT Communications
Adams Distributing
Alcom Electronics Exchange
Anixter Bros.
Atlas/Soundolier
Decibel Products 132
Haewa 107
Jon/Beau
Meridian Communications
Mobicom
Newton Instrument
The Parts Connection
Ritz Electronics (RELCO)
Secom Systems

Spectrum Communications
Synthex Communications Group
Tele-Path
Tessco 25
Uniden Corporation of America
U.S. Power Converting
Wildcat Electronics

RECORDERS

AAT Communications
Apogee
Audio Data
Dictaphone 65
Dinet 56
Electrodata
Evans & Evans Associates,
Communications Consultants
HCS
Heliotrope General
JEI
Ommicon Electronic 58
Plectron
Racal Recorders
Reproduction Technologies
Stancil

REMOTE CONTROL, TONE, DC AND OTHERS

AAT Communications
Adams Distributing
Advanced Computer Controls
Advanced Electronic Applications 124
Air Comm
The Antenna Farm
Argus Electronics
Avtec 27
Beam Radio
Bramco 120
California Radio
Cartwright Communications
CES Communications Electronics
Specialties 7
Comark Distributing
Communications Associates 20
Communications Equipment Brokers
Communications Products
Connect Systems 17
Console Systems
Crescent Radio Electronics
D&L Communications 72
Electronic Products
Evans & Evans Associates,
Communications Consultants
Gregory Electronics
Hill Radio Communications
Hutton National
M. Hutton & Company 84
ICOM America 15
IDA
E. F. Johnson 43
Lancer Electronics
Manon Engineering
Meridian Communications
Midian Electronics 40
Mobicom
Monroe Electronics
Moseley Associates
MX-COM 9
Neutec, Div. of Celltronic
The Parts Connection

Can You Really Identify Who's Transmitting?



DIGITAL UNIT IDENTIFICATION is the industry standard adopted by General Electric and Motorola to positively identify mobile and portable transmitters in public safety, fire, government, business and industrial radio systems. Only Coded offers full compatibility with these standards.

SUPERIOR SIGNALING RELIABILITY

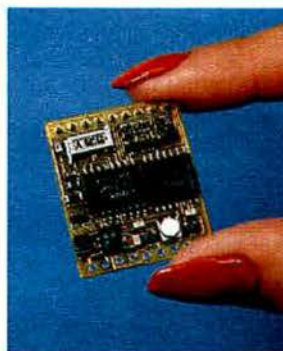
Digital PSK modulation is employed in combination with powerful error detection and correction protocols to provide superior accuracy and reliability. Coded's automatic transmitter identification encoders and decoders typically exceed 99.99% signaling reliability at signal-to-noise ratios too low to support effective voice communications.

FAST AND ACCURATE

In less than a third of a second the entire four digit identification burst is transmitted, received, error detected, corrected and displayed. This is less time than it takes to send four simple DTMF tone digits without the benefits of error detection and correction.

COMPLETE SYSTEMS CAPABILITY

Coded's full line of products are compatible with existing radio equipment to meet the needs of both large and small systems. Our sub-



miniature encoders are designed to fit the smallest portable and mobile equipment and are easily installed. Coded's status display system, shown above, provides dispatchers with an efficient cost effective solution for fleet status monitoring. Our system controllers are designed to interface with complex CAD systems and can accommodate the largest public safety fleets.

FIND OUT WHY CODED IS BEST

Let Coded identify solutions for your requirements and discover why Coded is the leader in transmitter identification products.

Coded
communications

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TELEPHONE 619 431-0077

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Powerline 97
Primus Electronics 87
Pulstar Distributing
Radio Barn
Raven Electronics 106
Repeco 313
Schaefer Radio
Secom Systems
Selectone 104
Sigtone
Smith Communications Service
Solid State Communications 3

Southern Plains Recon
Spectrum Communications
TEDI
Tele-Path
Tessco 25
Two/Comm
Uniden Corporation of America
Unitronics
Vega, A Mark IV Company
Signaling Products Group 1
Webster Communications
Wildcat Electronics
Wisco International

C.W. Wolfe Communications
Yusa USA 118
Zetron 50, 111

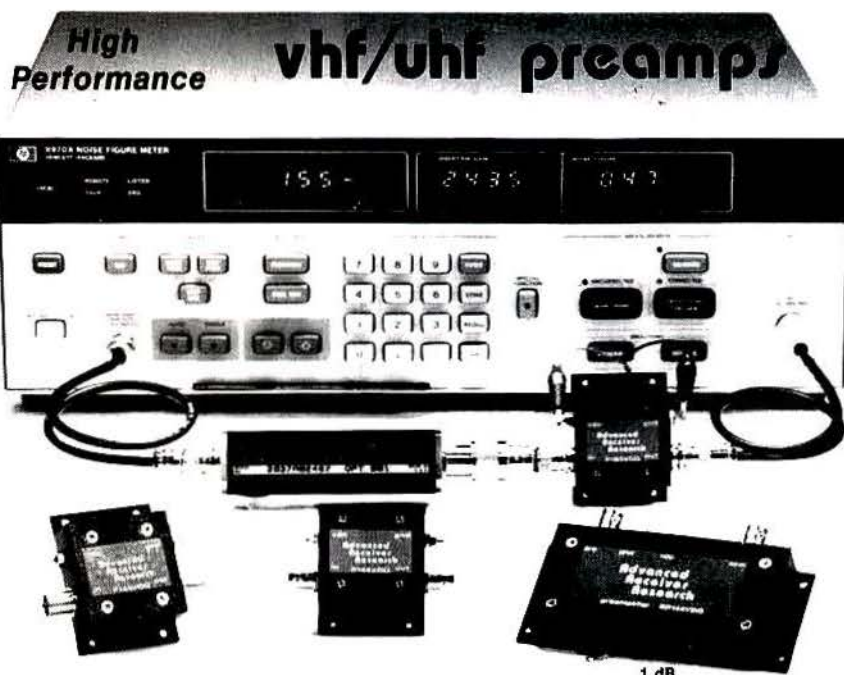
REPEATER CONTROL EQUIPMENT

AAA Communication Mfg.
AAT Communications
Adams Distributing
Advanced Computer Controls
Air Comm
The Antenna Farm
Beam Radio
CES-Communications Electronics
Specialties 7
Comark Distributing
Communication Engineers
Communication Systems
The Communications Center
Communications Electronics Specialties
Communications Equipment Brokers
Communications Specialists 16
Connect Systems 17
Console Systems
Creative Control Products
Dixie Communications
D&R Associates
Electronic Products
Evans & Evans Associates
Communications Consultants
Doug Hall Electronics 107
M. Hutton & Company 84
E. F. Johnson 43
Lancer Electronics
Lesmith
Manon Engineering
Meridian Communications
MFJ Enterprises
Midian Electronics 40
Midland Land Mobile Radio
Moseley Associates
Motorola, Communications Sector
Neutec, Div. of Celltronics
NorComm 98
Pace Electronics, Div. TeleMobile
The Parts Connection
Repeco 33
RF Concepts
Schaefer Radio
Secom Systems
Selectone 104
Spectrum Communications
Synthex Communications Group
Telemobile
Tele-Path
Tessco 25
Transcript International 5
Trilectic
Two/Comm
Uniden Corporation of America
Wildcat Electronics
Wisco International
C.W. Wolfe Communications

REPEATERS

Base

AAT Communications
Adams Distributing
Advanced Videotech
Aerotron 47
Air Comm



Receive only	Freq. Ranges (MHz)	N.F. (dB)	Gain (dB)	Comp. (dBm)	Device Type	Price
P30VD, P35VD, P40VD, P45VD	30-35, 35-40, 40-45, 45-50	<1.3	15	0	DGFET	\$ 44.95
P30VDG, P35VDG, P40VDG, P45VDG	30-35, 35-40, 40-45, 45-50	<0.5	26	+12	GaAsFET	\$109.95
P150VD, P160VD, P170VD	150-160, 160-170, 170-180	<1.5	15	0	DGFET	\$ 44.95
P150VDA, P160VDA, P170VDA	150-160, 160-170, 170-180	<1.1	15	0	DGFET	\$ 56.95
P150VDG, P160VDG, P170VDG	150-160, 160-170, 170-180	<0.5	24	+12	GaAsFET	\$109.95
P450VD, P460VD	450-460, 460-470	<1.8	15	-20	Bipolar	\$ 49.95
P450VDA, P460VDA	450-460, 460-470	<1.2	16	-20	Bipolar	\$ 74.95
P450VDG, P460VDG	450-460, 460-470	<0.5	16	+12	GaAsFET	\$109.95
P800VDG, P830VDG, P860VDG	800-830, 830-860, 860-890	<0.6	19	+12	GaAsFET	\$119.95
Inline (rf switched)						
SP30VD, SP35VD, SP40VD, SP45VD	30-35, 35-40, 40-45, 45-50	<1.4	15	0	DGFET	\$ 74.95
SP30VDG, SP35VDG, SP40VDG, SP45VDG	30-35, 35-40, 40-45, 45-50	<0.55	26	+12	GaAsFET	\$139.95
SP150VD, SP160VD, SP170VD	150-160, 160-170, 170-180	<1.6	15	0	DGFET	\$ 74.95
SP150VDA, SP160VDA, SP170VDA	150-160, 160-170, 170-180	<1.2	15	0	DGFET	\$ 86.95
SP150VDG, SP160VDG, SP170VDG	150-160, 160-170, 170-180	<0.55	24	+12	GaAsFET	\$139.95
SP450VD, SP460VD	450-460, 460-470	<1.9	15	-20	Bipolar	\$ 79.95
SP450VDA, SP460VDA	450-460, 460-470	<1.3	16	-20	Bipolar	\$104.95
SP450VDG, SP460VDG	450-460, 460-470	<0.55	16	+12	GaAsFET	\$139.95

Every preamplifier is precision aligned on ARR's Hewlett Packard HP8970A/HP346A state-of-the-art noise figure meter. RX only preamplifiers are for receive applications only. Inline preamplifiers are rf switched (for use with transceivers) and handle 25 watts transmitter power. Mount inline preamplifiers between transceiver and power amplifier for high power applications. System S/N Improvement 6-14 dB typical. Other amateur, commercial and special preamplifiers available in the 1-1000 MHz range. Please include \$2 shipping in U.S. and Canada. C.O.D. orders add \$2. Air mail to foreign countries add 10%. Order your ARR RX only or inline preamplifier today and start hearing like never before!

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A computerized command center with a series of easy-to-read screens makes the Veritrac® Series 9000 much easier to listen to. Just one look enables you to locate and playback information from up to four separate decks. Instantly. It also tells you exactly which decks are in use, their mode of operation, and how much recording time is left. All of which give you the world's most accurate and organized communications records.

Another feature that makes this remarkable system clearly superior is its unique modular design. It's very simple to upgrade and expand up to 240-channels as your needs grow. Right on the premises. Eliminating costly installation fees.

The Veritrac Series 9000 is also equipped with a fail-safe backup system.

ODDLY ENOUGH, THE MOST EFFECTIVE WAY TO LISTEN TO A COMMUNICATIONS RECORDING SYSTEM IS NOT WITH YOUR EARS.

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takes a company with vision. To find out more, mail in the coupon, fax to 1-203-381-7100, or call 1-800-433-0880. It could be a real eye-opener.



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Company _____ Phone _____

Address _____

City _____ State _____ Zip _____



Dictaphone

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Circle (68) on Fast Fact Card

Apogee
Argus Electronics
A.S.K. Communications
Astronet
Beam Radio
Canadian Marconi
Cellular Design
Cetacea Sound
Communication Engineers
Communications Associates 20
Communications Equipment Brokers
The Jack Daniel Company
Diversified Electronics

D&R Associates
DX Radio Systems 91
Earmark
Evans & Evans Associates,
Communications Consultants
General Electric, Mobile Communications
Business
Glenayre Electronics
Glenayre Electronics, Quincy Operation
Great Lakes Communications Sales
Gregory Electronics
Hi-Com Systems
Hill Radio Communications

Hite Electronic Sales
M. Hutton & Company 84
ICOM America 15
E. F. Johnson 43
Kenwood USA 53
Kukjae Electronics
Lexington Communications
Manon Engineering
Mechem Electronics
Meridian Communications
Midland Land Mobile Radio
Motorola, Communications Sector
Multi-Media Communications
Neutec, Div. of Celltronics
Nu-Way Marketing
Pace Electronics, Div. TeleMobile
Paramount Communication Electronics
Parkinson Electronics
The Parts Connection
Qwint Data
Radio Barn
Radio Systems
RELM Communications 49
Repro 33
Rettig Electronics
Ritron 73
Schaefer Radio
SEA
Secom Systems
Smith Communications Service
Southern Plains Recon
Spectrum Communications
Standard Communications 77
Synthex Communications Group
Syntonic
Tait Electronics USA
Telemobile
Tele-Path
Teletec
Tessco 25
Two/Comm
Uniden Corporation of America
Webster Communications
Wildcat Electronics
Wisco International
C.W. Wolfe Communications

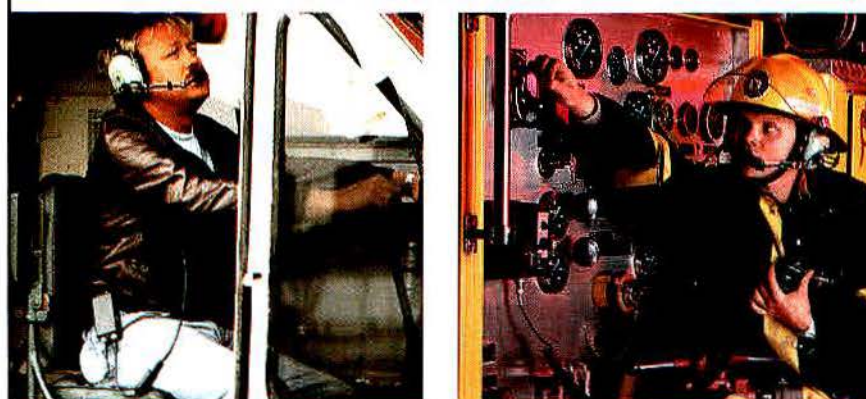
Crossband

AAT Communications
Adams Distributing
Aerotron 47
Apogee
Beam Radio
Canadian Marconi
Communication Engineers
Communications Equipment Brokers
The Jack Daniel Company
D&R Associates
DX Radio Systems 91
General Electric, Mobile Communications
Business
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Hill Radio Communications
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Mechem Electronics
Meridian Communications
Midland Land Mobile Radio
MX.COM 9
Neutec, Div. of Celltronics
Nu-Way Marketing
Pace Electronics, Div. TeleMobile
Paramount Communication Electronics

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**YOUR
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High noise can make two-way radio communication difficult, if not impossible. Combine your two-way radio with one of our Noise Attenuating Headsets to solve this problem.

David Clark Company Headsets combine maximum hearing protection, with comfort and perfect reception. Superior noise-canceling microphones deliver clear transmissions at normal voice levels.

NO RADIO MODIFICATIONS ARE NEEDED.

Choose between hands-free VOX (voice activated) or Push-To-Talk operation.

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Introducing
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SRL-501R3 CE

**The Smallest in the Market
The SRL-501 Series Diversity
Antenna**

The smallest package in the market, this compact (height 2.28 in. (58 mm) to 3.15 in. (80 mm) X 9.3 in. (236 mm) diameter) diversity antenna has almost unlimited applications in the data mobile radio market as well as cellular, automated train control and upband trunking operating in the 824 - 1400 MHz range.



**Better Than a Yagi
The Compact SRL-440
Series Data Antenna**

Measuring 10.5 in. (267 mm) long by 2.5 in. (64 mm) wide and weighing only 2.5lb. (1.12 kg), this antenna operates in the 928 to 956 MHz band.

The 440 is excellent where reliable data transfer is essential. It's ideal for multi-point systems, point-to-point and receive sites.... anywhere you might use a yagi.... and it's more economical!

It's unaffected by windload and icing problems, which often affect yagis.

For complete specifications
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Over 35 years
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radiated power
design and
innovation
have made us
leaders in
data antenna
systems.

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where smaller is better

The Parts Connection
Radio Systems
Raven Electronics 106
Repen 33
Ritron 73
Secom Systems
Spectrum Communications
Synthex Communications Group
Syntonic
Tait Electronics USA
Telemobile
Tele-Path
Teletec

Uniden Corporation of America
Webster Communications
Wisco International
C.W. Wolfe Communications

Mobile

AAT Communications
Adams Distributing
Aerotron 47
Air Comm
Apogee
Cetacea Sound

Communication Engineers
Communications Equipment Brokers
Daniels Electronics
Diversified Electronics
D&R Associates
Electronic Products
EMCEE Broadcast Products 88
Evans & Evans Associates,
Communications Consultants
General Electric, Mobile Communications
Business
Gregory Electronics
Hill Radio Communications
E. F. Johnson 43
Mechem Electronics
Meridian Communications
Midland Land Mobile Radio
Nu-Way Marketing
Pace Electronics, Div. TeleMobile
Parkinson Electronics
Peninsula Engineering Group
Qwint Data
Radio Systems
Ritron 73
Standard Communications 77
Sweet Electronics
Syntec Communications Systems
Synthex Communications Group
Tait Electronics USA
Telemobile
Tele-Path
Telex-Magnum 22
Tessco 25
Transcript International 5
Two/Comm
Uniden Corporation of America
Wildcat Electronics
Wisco International

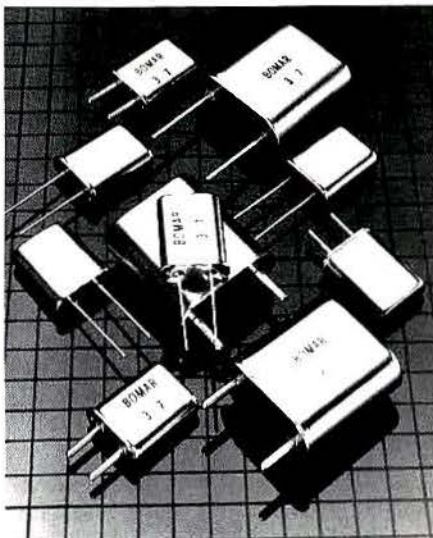
Portable

DX Radio Systems 91

RF FILTERS --See ANTENNA SITE EQUIPMENT**RF LINKS**

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Adams Distributing
Advanced Electronic Applications 124
AEA-Advanced Electronic Applications
The Antenna Farm
Apogee
Argus Electronics
Beam Radio
Canadian Marconi
Communication Engineers
CSI Communication Systems
The Jack Daniel Company
D&L Communications 72
Evans & Evans Associates,
Communications Consultants
General Electric, Mobile Communications
Business
GLB Electronics 58
Glenayre Electronics
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Hite Electronic Sales
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Lancer Electronics
Loral TerraCom
Lucas Leduc
Lunar Industries

On The Double



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are our specialty. Bomar delivers high performance crystals—on the double—when you need them. Technically speaking, our crystals are built rugged to last the life of the radio. And we guarantee it. Check us out. Send us your order—and we'll turn it around on the double.

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Mechem Electronics	
Microlink	
Microwave Data Systems	
Microwave Networks	
Monitor	
Neulink, Div. of Celltronics	
Neutec, Div. of Celltronics	
Nu-Way Marketing	
Pace Electronics, Div. TeleMobile	
The Parts Connection	
Radio Systems	
Repco	33
Ritron	73
Secom Systems	
Southern Plains Recon	
Spectrum Communications	
Syntec Communications Systems	
Tait Electronics USA	
TEDI	
Tekk	11
Telemobile	
Tele-Path	
Teletec	
Transcrypt International	5
Uniden Corporation of America	
Western Multiplex	
Wildcat Electronics	
Wisco International	

SCANNING RECEIVERS (SCANNERS)

AAT Communications	
Ace Communications	
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Beam Radio	
Cellular Wholesalers	
Cobra/Dynascan	
Commtron	
Danny's Two-Way Communications	
Diversified Electronics	
GRE-America	
Great Lakes Communications Sales	
ICOM America	15
IFR Systems	51
Lancer Electronics	
Mountain Communications	
The Parts Connection	
Pulstar Distributing	
S.H.E.	
Statistical Control Systems	99
Teletec	
Two/Comm	
Uniden Corporation of America	
Wildcat Electronics	
Wisco International	

SCRAMBLERS, ENCRYPTION DEVICES

AAT Communications	
Adams Distributing	
Advanced Electronic Applications	124
Argus Electronics	

Beam Radio	
Canadian Marconi	
Cellular Depot	
Cellular Wholesalers	
Communication Engineers	
Communications Equipment Brokers	
Cycomm	
Evans & Evans Associates,	
Communications Consultants	
Freeman Engineering Associates	41
General Electric, Mobile Communications	
Business	
GRE-America	
ICOM America	15
Kryptic	
Kryptic Radio	
Lancer Electronics	
Lesmith	
Microwave Filter	
Midian Electronics	40
Mobicom	
Motorola, Communications Sector	
MX-COM	9
Neutec, Div. of Celltronics	
Pace Electronics, Div. TeleMobile	
Pacific Circuit Design	
The Parts Connection	
Research Electronics	
Rettig Electronics	
Secom Systems	
Selectone	104
Shinwa Tsushinki	
Smith Communications Service	

A NEW LITTLE PIGGY

There's a new pigtail in town: The all new Larsen® KG-825 On-Glass Cellular Antenna.

It's sleek. Sexy. With a high-tech European look designed for performance as well as appearance — distinctively more elegant than its competition. The KG-825 also sports a small "footprint" which conforms

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Technically speaking, the KG-825 is the most advanced antenna we've ever made. We've placed its patented* impedance-matching circuitry on the outside of the glass with the radiating element, creating a low impedance power transfer through the glass. No tuning is required.



Telemobile
Teletec
Teltron-North America
TorFino Enterprises
Transcrypt International 5
Uniden Corporation of America
U.S. Power Converting
Webster Communications
Wisco International

SELECTIVE CALLING --See SIGNALING

SEMICONDUCTOR TESTERS

AAT Communications
John Fluke Mfg.
General Electric, Business Information
Center
Leader Instruments
The Parts Connection
Sencore

SERVICE MANUALS

Cellular Wholesalers
D&I, Communications 72
Forest Industries Telecommunications
ICOM America 15
E. F. Johnson 43
Mannbros Technologies
Mechem Electronics
Midland Land Mobile Radio

Parkinson Electronics
Sencore
Tessco 35
Wisco International
C.W. Wolfe Communications

SERVICE MONITORS AND MODULATION DEVIATION METERS

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ALE 105, 128
Alcom Electronics Exchange
Canadian Marconi
Cellular Wholesalers
Comark Distributing
Communication Engineers
Communication Instruments
Communications Associates 20
The Communications Center
Communications Equipment Brokers
Com-Ser Labs
CSC Inc.
CT Systems 57
Cushman Electronics
D&R Associates
Electronic Products
Great Lakes Communications Sales
Hepler Instruments 121, 126, 131
Hutton National
M. Hutton & Company 84
IFR Systems 51

Manon Engineering
Mechem Electronics
Meridian Communications
Motorola, Communications Sector
The Parts Connection
Primus Electronics 87
Ramsey Electronics 48
Schlumberger Instruments 69

Secom Systems
TEDI
Tele-Path
Tessco 25
Two/Comm
Wavetek RF Products 23

Webster Communications
Western Multiplex
Wisco International

SHELTERS

Alabama Easi-Set
Andrew
Bally Engineered Structures
Communications West
Concrete Systems
Easi-Set Industries
Enviro-Buildings
Evans & Evans Associates,
Communications Consultants
Fort Worth Tower
GFRC Shelters
Great Lakes Communications Sales

Company Addresses begin on page 90

GOES TO MARKET.

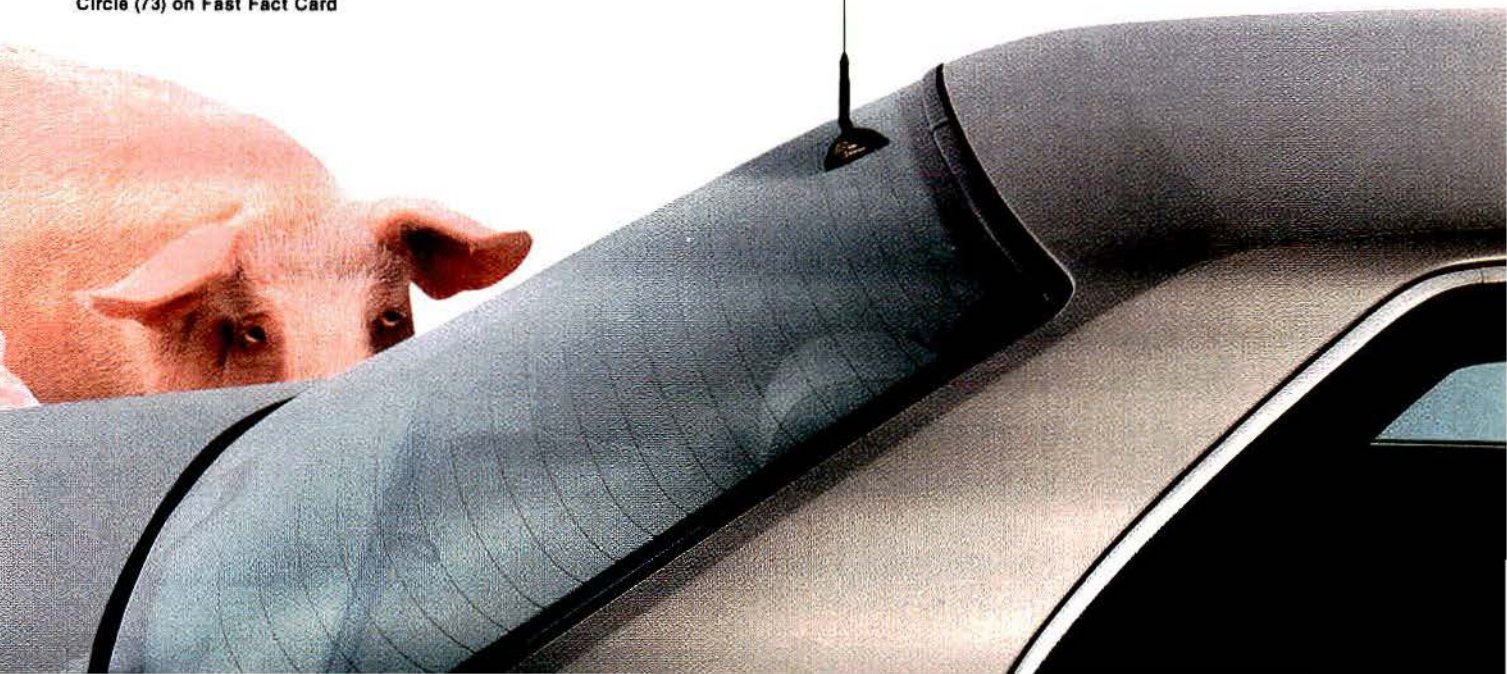
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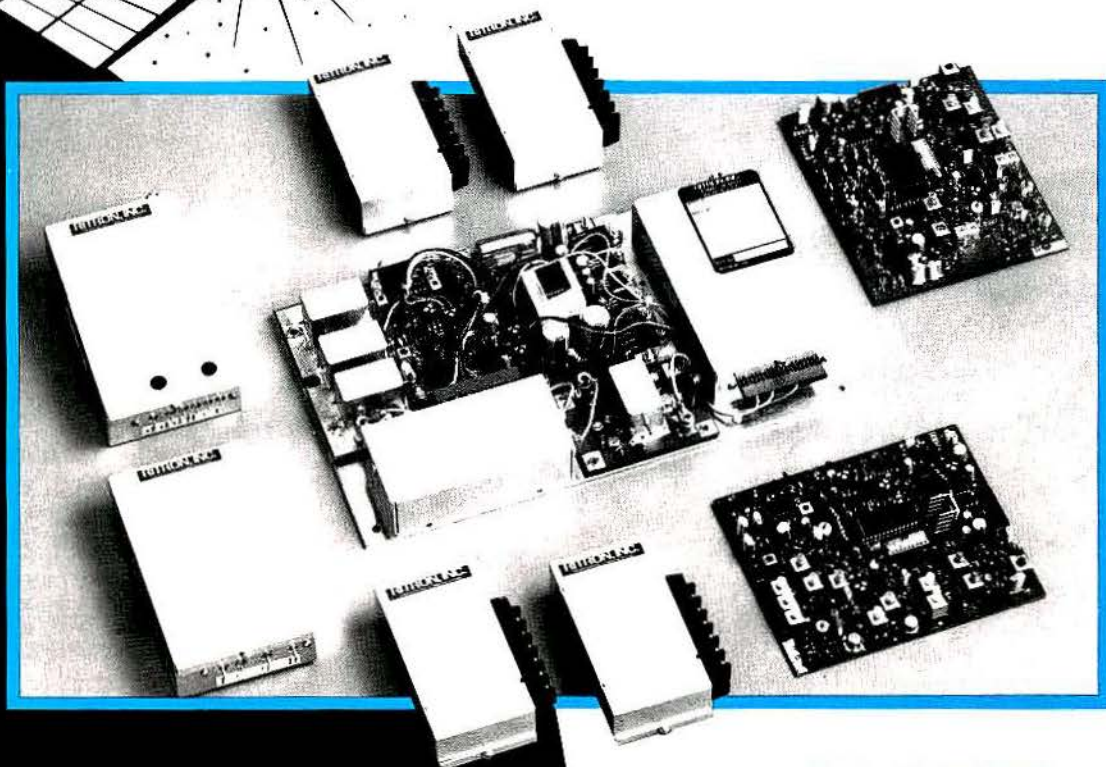
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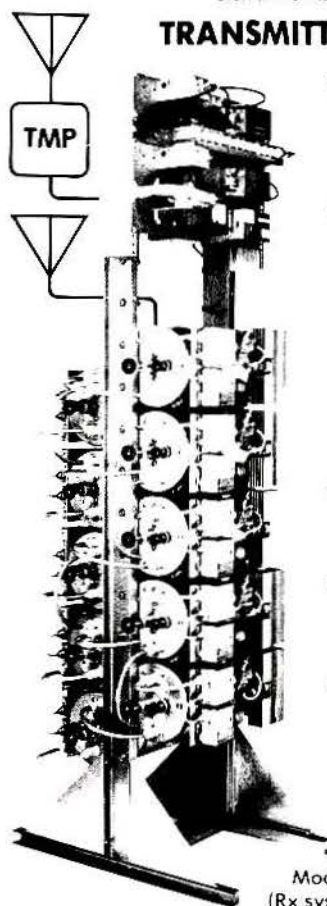
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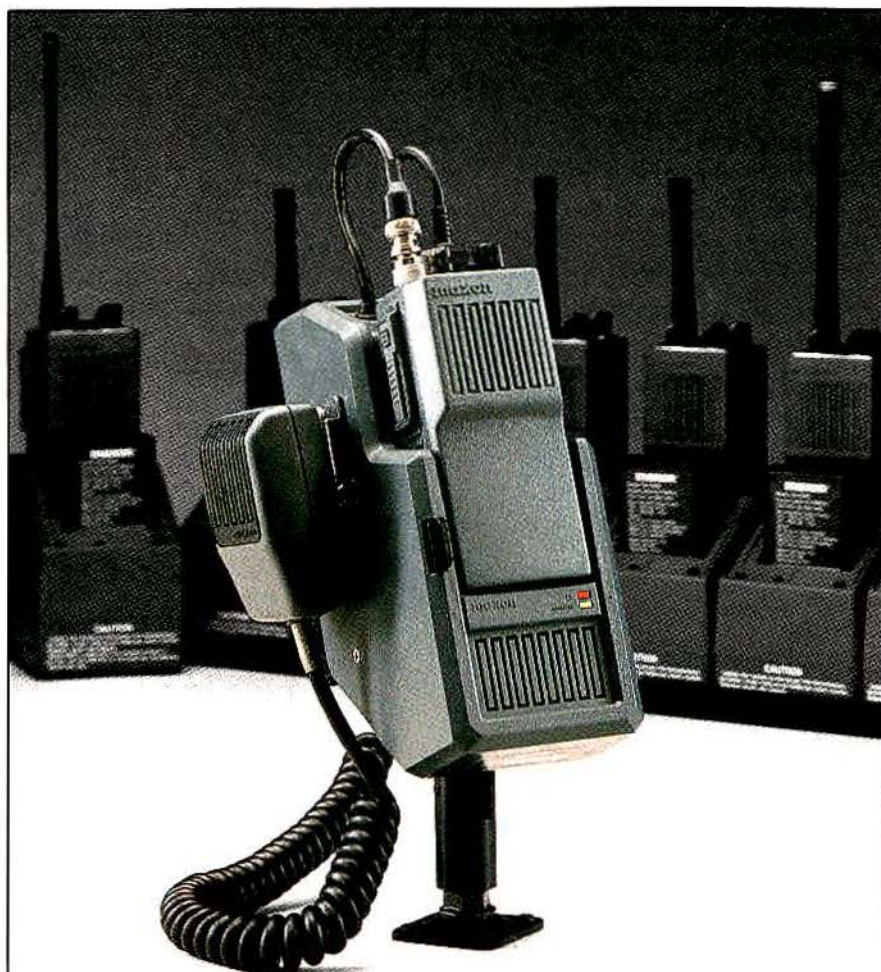
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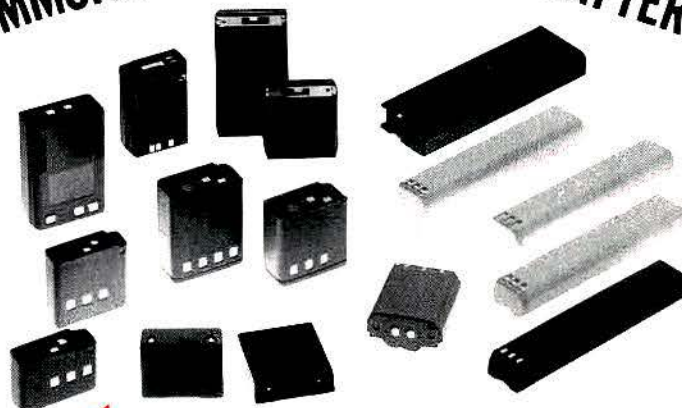
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AAT Communications	
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MODEL VS-50M

RM-A SERIES

MODEL RM-35M

RS-A SERIES

MODEL RS-7A

RS-M SERIES

MODEL RS-35M

VRM/VS-M SERIES

MODEL VS-35M

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •

RS, RM and VS SERIES

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- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output.
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- THREE CONDUCTOR POWER CORD
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PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105 - 125 VAC
- OUTPUT VOLTAGE: 13.8 VDC \pm 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE: Less than 5mv peak to peak (full load & low line)
- Also available with 220 VAC Input Voltage

19" X 5 1/4" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping WL (lbs.)
RM-12A	9	12	5 1/4 x 19 x 8 1/4	16
RM-35A	25	35	5 1/4 x 19 x 12 1/2	38
RM-50A	37	50	5 1/4 x 19 x 12 1/2	50
• Separate Volt and Amp Meters				
RM-35 M	25	35	5 1/4 x 19 x 12 1/2	38
RM-50 M	37	50	5 1/4 x 19 x 12 1/2	50
RS-4A	3	4	3 3/4 x 6 1/2 x 9	5
RS-5A	4	5	3 1/2 x 6 1/2 x 7 1/4	7
RS-7A	5	7	3 3/4 x 6 1/2 x 9	9
RS-10A	7.5	10	4 x 7 1/2 x 10 3/4	11
RS-12A	9	12	4 1/2 x 8 x 9	13
RS-20A	16	20	5 x 9 x 10 1/2	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13 3/4 x 11	46

• Switchable volt and Amp meter				
RS-12M	9	12	4 1/2 x 8 x 9	13
• Separate volt Amp meters				
RS-20M	16	20	5 x 9 x 10 1/2	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 3/4 x 11	46

• Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts				
• Current limit adjustable from 1.5 amps to Full Load				
	for 13.8VDC @ 10VDC @ 5VDC		@ 13.8V	
VS-20M	16	9	4	20
VS-35M	25	15	7	35
VS-50M	37	22	10	50
• Variable rack mount power supplies				
VRM-35M	25	15	7	35
VRM-50M	37	22	10	50
			5 1/4 x 19 x 12 1/2	38
			5 1/4 x 19 x 12 1/2	50

* ICS—Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

* ICS—Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

DC-DC CONVERTERS

DC-DC CONVERTERS

MODEL 1212

MODEL 1212-18

MODEL 1212 & 1212-18 Switching Regulated Converter.

Designed for FM transceivers and other applications requiring 12 volt power source converted from 12 volt positive ground battery. Regulation with pulse width modulation at 20 KHz.

Input—12V DC (Positive ground only). Functional from -11 V DC to -16 V DC. Output +13.8 V DC (Negative ground only).

	1212		1212-18
Output Voltage	13.8 V DC	\pm .2 V DC	13.8 V DC \pm .2 V DC
Line/Load Regulation	200 mV		200 mV
Ripple/Noise	50 mV RMS		50 mV RMS
Current Continuous	6 Amp		14 Amp
Current (ICS)	9 Amp		18 Amp
Current Limit	12 Amp		19 Amp
Case	2 3/4" (H) x 6" (W) x 6" (D)		2 3/4" x 6" x 12"
Shipping Weight	2 lbs.		4 lbs.

MODEL 2412

MODEL 2412-16

MODEL 2412 & 2412-16 Switching Regulated Converter.

Designed for FM transceivers and other applications requiring 12 volt power source converted from 24 volt battery. Regulation with pulse width modulation at 20 KHz.

Input +28 V DC (Negative ground only). Functional from +22 V DC to +32 V DC. Output +13.8 V DC (Negative ground only).

	2412		2412-16
Output Voltage	13.8 V DC	\pm .2 V DC	13.8 V DC \pm .2 V DC
Line/Load Regulation	200 mV		200 mV
Ripple/Noise	50 mV RMS		50 mV RMS
Current Continuous	9 Amp		16 Amp
Current Limit	12 Amp		20 Amp
Case	2 3/4" (H) x 6" (W) x 6" (D)		2 3/4" x 6" x 12"
Shipping Weight	2 lbs.		4 lbs.

ALSO! AVAILABLE AS MODEL 3612 & 3612-16: +36 V DC (Negative ground only) AND AS MODEL 4812 & 4812-16: +48 V DC (Negative ground only).

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Vision Systems
Waterford Systems

BROKERAGE

Benchmark Telecommunications
Clifton Gardiner & Associates
National Phone Number Centers

CONSULTANTS

Independent Consulting Engineers

AAT Communications
Adcomm Engineering
Adelphon
Air Safety International
American Site Network
Apogee
APREL-Advanced Research Engineering
Labs
Barton, Steiner & Associates
Lawrence Behr Associates
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Climate-Tel
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Communications Solutions
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CompuSource
Consulting Engineer
Coopers & Lybrand
CTA-Communications Technology
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The Jack Daniel Company
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Lunar Industries
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Mobile Communications Consulting

MS & Associates
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OMNICOM
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PRC Public Management Services
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 Telemobile
 Teletec
 The Thornhill Company
 Vision Systems

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Mobiles, Portables, Pagers and Others

AAT Communications
 ACS-Advanced, Communication Services
 Adams Distributing
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 Page Communications
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 The Parts Connection
 Peninsula Engineering Group
 Plectron
 Portable Technical Services
 Porta-Tech
 S.H.E.
 S&I Technical Services
 Smith Communications Service
 Southern Plains Recon
 Syntec Communications Systems
 Telecomm Services

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DO IT THREE WAYS

Personal Voice Announcer



1601 Solid State
Voice Storage Unit

or

Program by Switch Settings



1401 Morse Code
Station Identifier

or

Pre-programmed PROM



1300 Morse Code
Station Identifier

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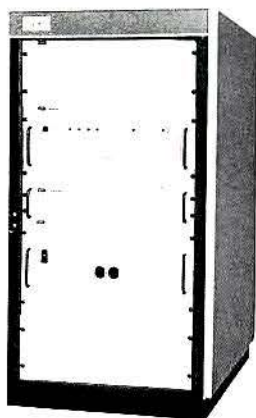
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APREL-Advanced Research Engineering Labs
Benchmark Telecommunications
The Jack Daniel Company
Diversity Communications
Evans & Evans Associates,
Communications Consultants
Falkner & Associates
Forest Industries Telecommunications
Hartech
Magnavox/Nav-Com
Mannbros Technologies
McCabe & Allen
Stuart Meyer Consultant
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Educational Radio (NABER)
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Service
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Technical Communications Software
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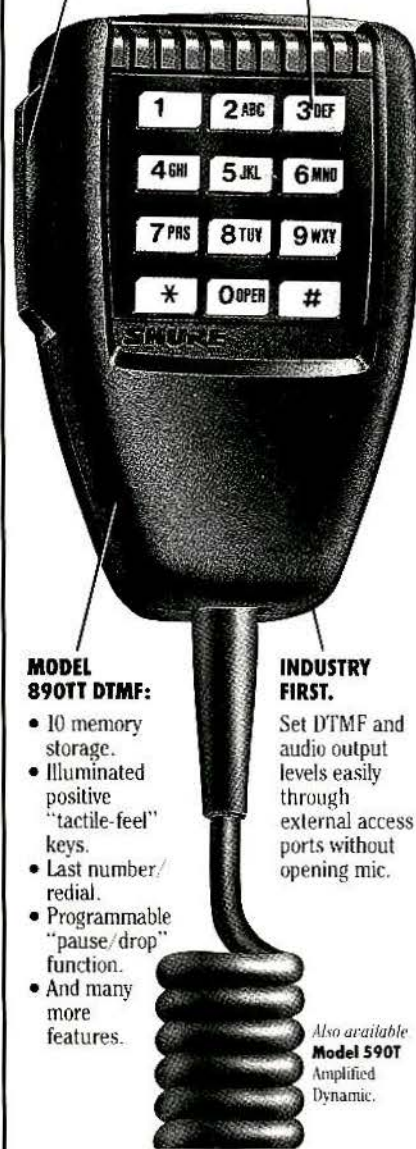
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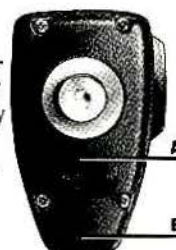


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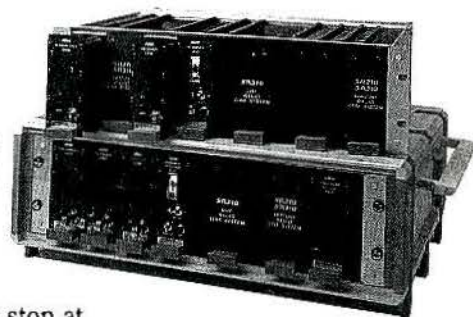
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Frankly, DX Radio Systems Makes The Competition Look...Well... Primitive.



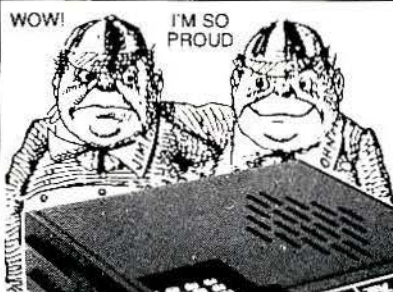
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Dear Mr. Galvin:

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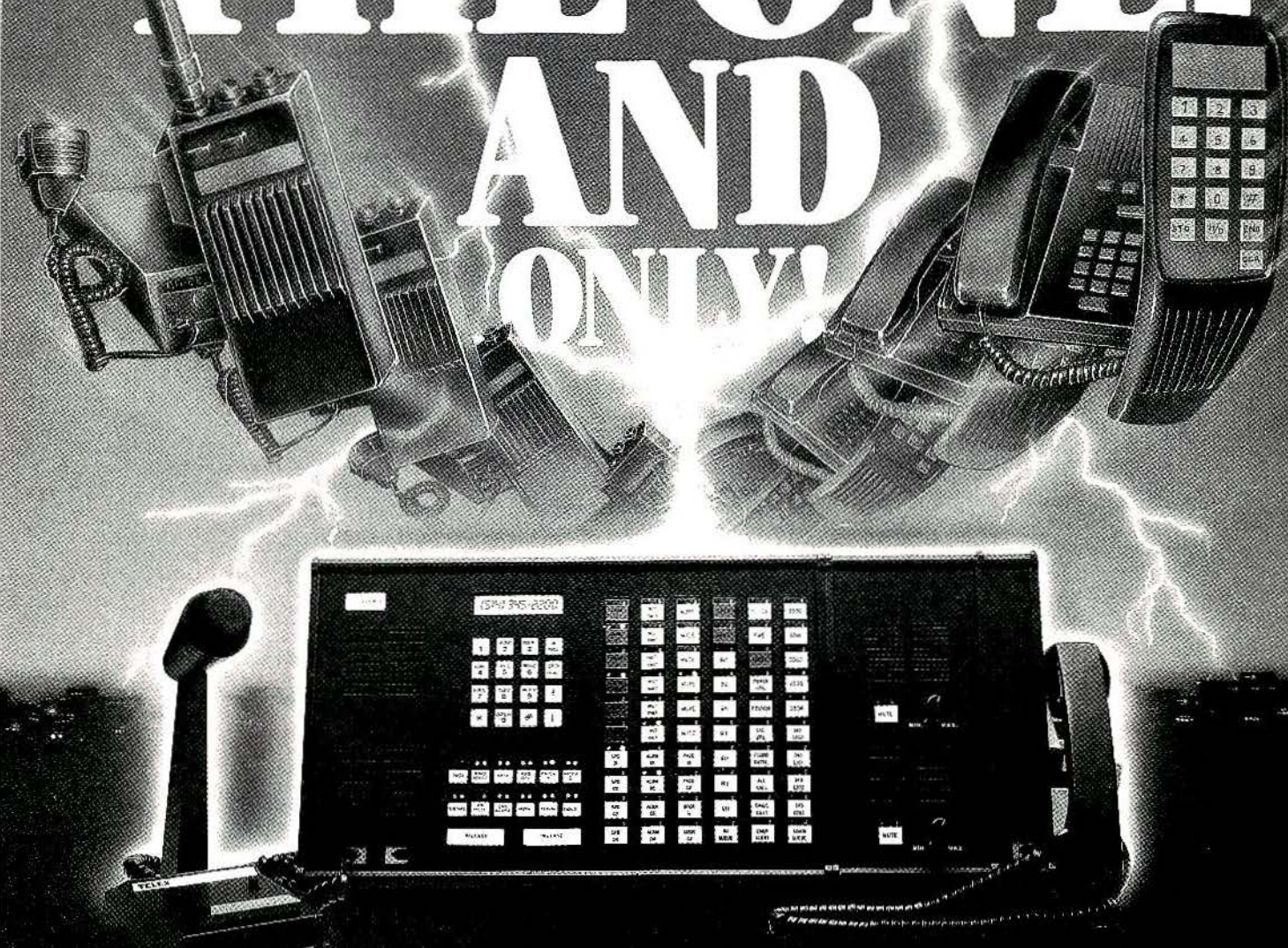
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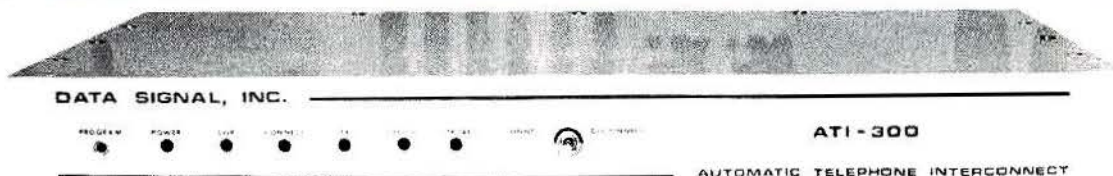
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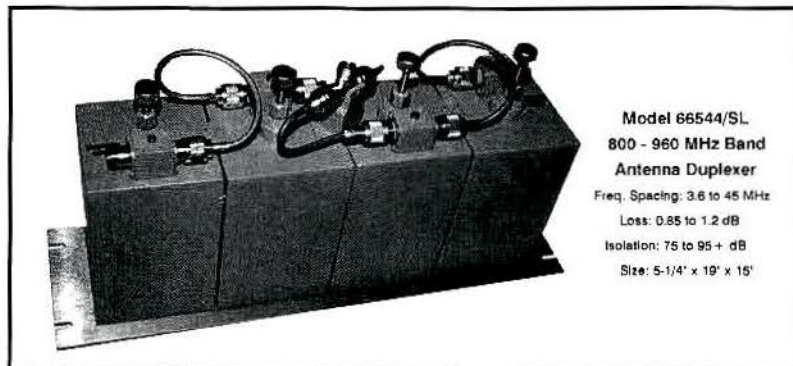
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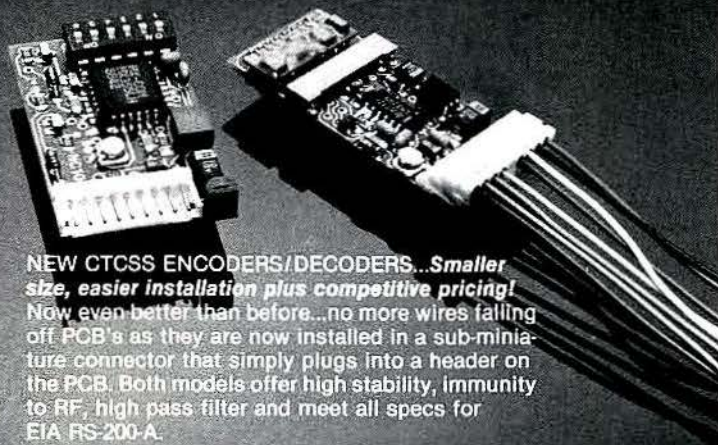
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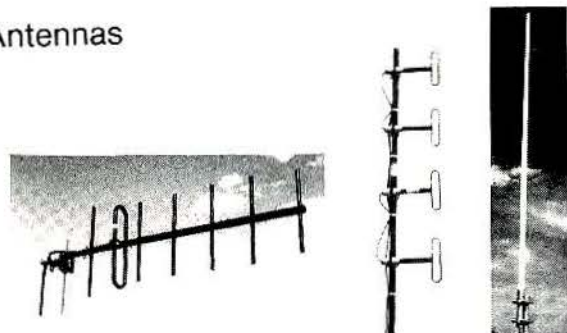
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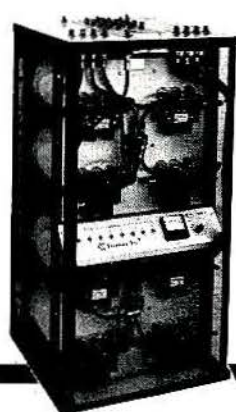
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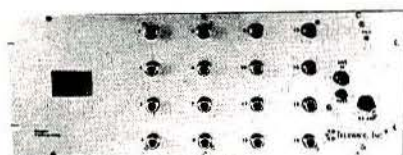
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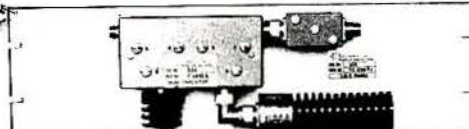
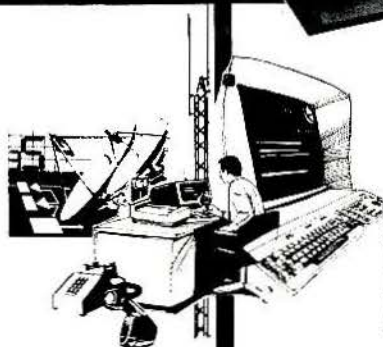
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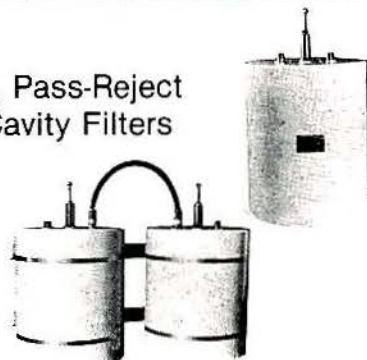
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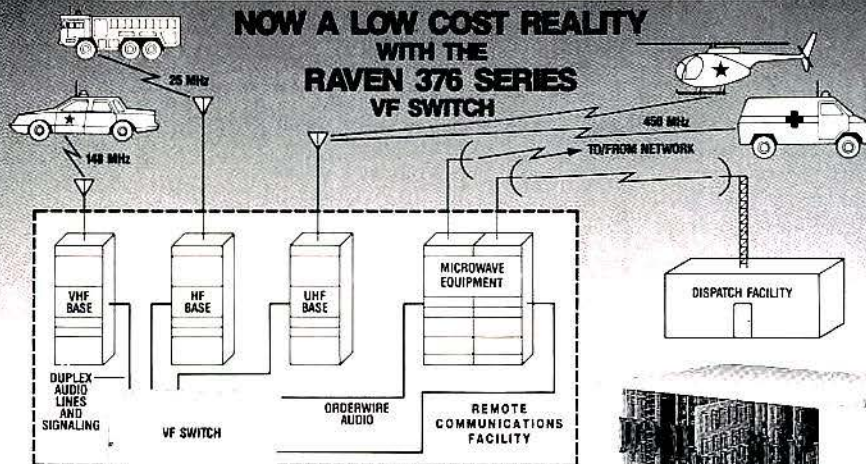
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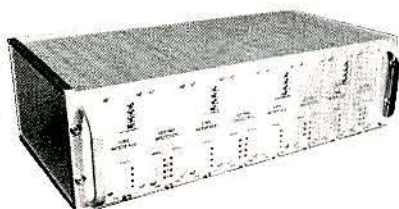
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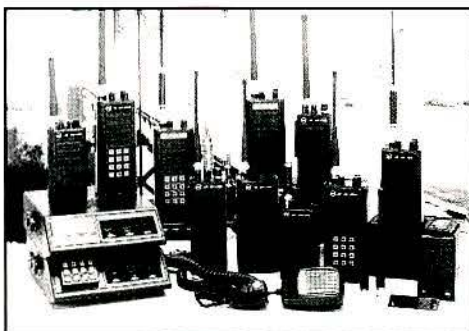
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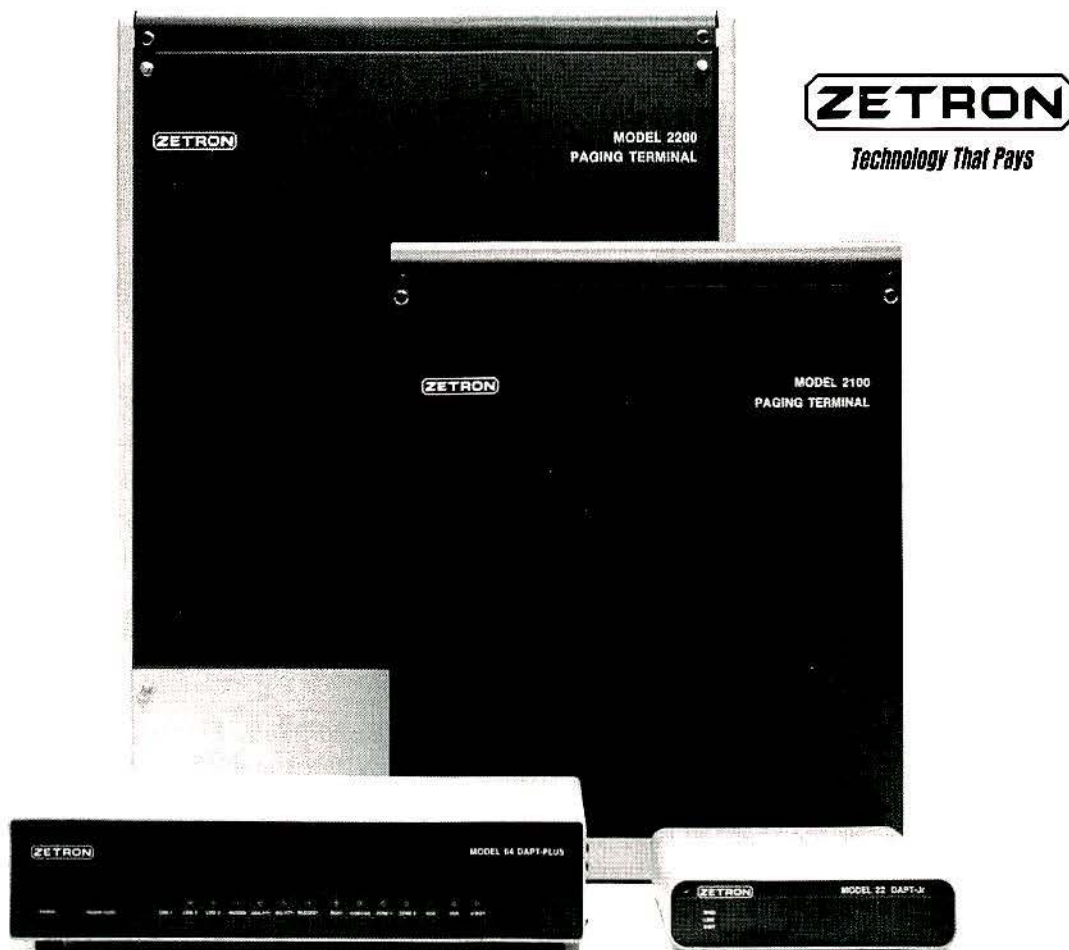
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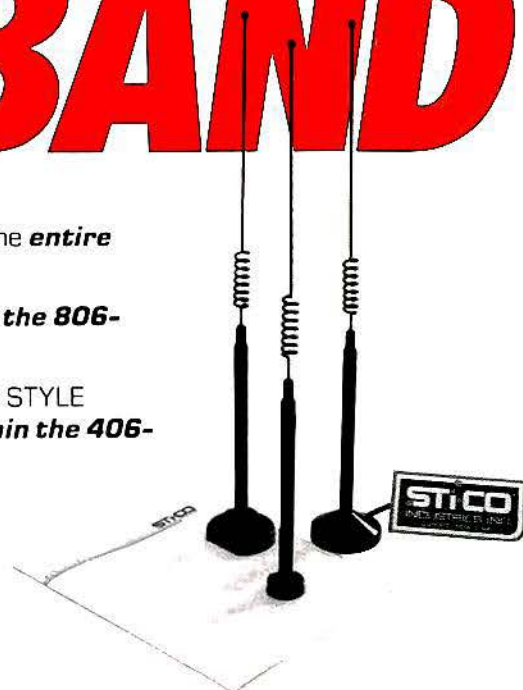
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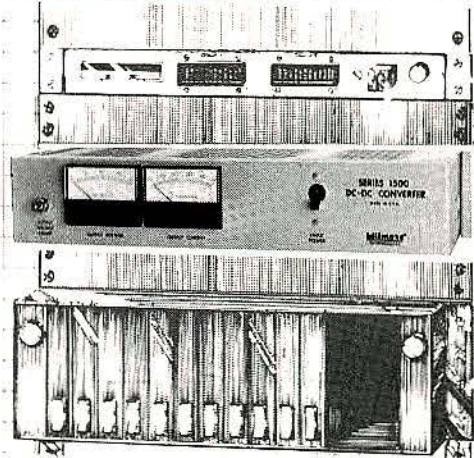
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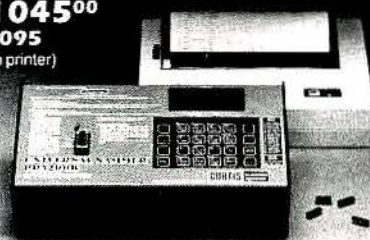
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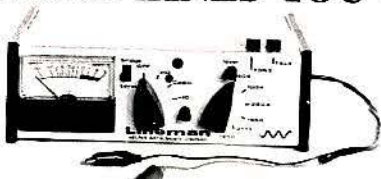


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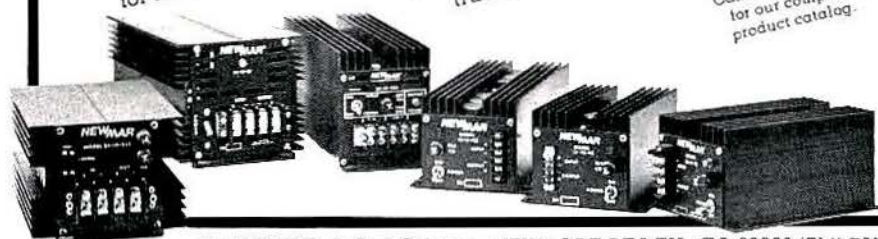
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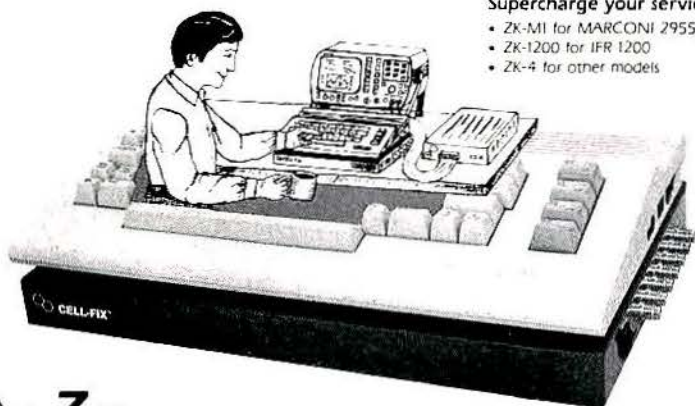
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800-527-9366
Fax 214-278-5984

VDO-PAK
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800-767-9771
Fax 904-756-9733

Vector Structural
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Mansfield, TX 76063
817-473-9386
Fax 817-477-3427

Vega, A Mark IV Company
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818-442-0782
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NY, Plainview (516) 931-1414
OH, Fairfield (513) 874-3232
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WA, Bellevue (206) 455-0773
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Vega Cellular Consultants
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Orlando, FL 32854
407-425-9072
Fax 407-422-8889

The Vest
1290-D Maunakea St.
Honolulu, HI 96817
808-599-4630
Fax 808-599-5488

VFP
3525 Aerial Way Drive S.W.
Roanoke, VA 24018
703-344-0966
Fax 703-981-0613

Vidcom Mfg.
12898 Farmington Road
Livonia, MI 48150
313-261-9444
Fax 313-261-2855

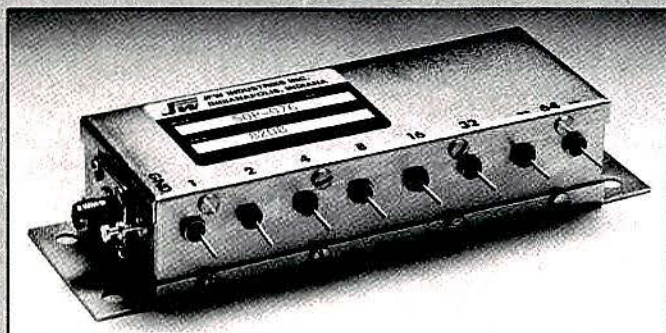
Vir James
3137 W. Kentucky Ave.
Denver, CO 80219
303-937-1900
Fax 303-937-1902

VISCOM-Visual Communications
Service
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St. Charles, MO 63303-6141
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800-441-5258
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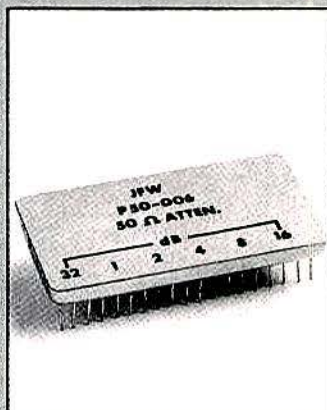
Vision Systems
1890 Main St.
Quincy, IL 62301
217-228-1361
Fax 217-228-9350

Product Directory begins on page 12

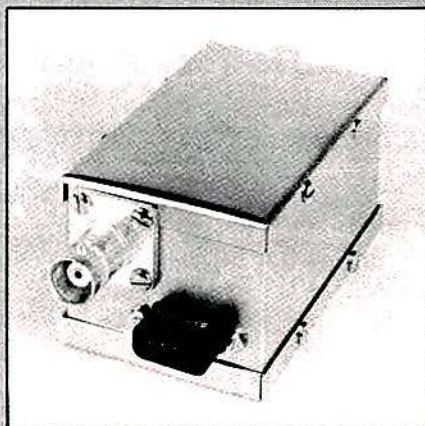
Programmable Attenuators



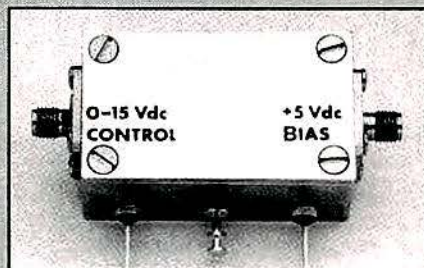
Model 50P-076
Frequency Range
DC-1000 MHz
Attenuation Range
0-127 dB in 1 dB steps
Attenuation Steps
1, 2, 4, 8, 16, 32 and 64 dB



Model P50-006
Frequency Range
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Attenuation Range
0-63 dB in 1 dB steps
Attenuation Steps
1, 2, 4, 8, 16 and 32 dB



Model 50P-280
Frequency Range
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Attenuation Range
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Waterford Systems
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MD, Rockville (301) 251-4100
MA, Danvers (508) 777-5600
MN, Edina (612) 831-7169
NY, Great Neck (516) 829-3770
NY, Melville (516) 454-8440
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Fax 415-595-2280

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TX, Houston (713) 932-6360

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315-769-8334

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800-722-1151 (MN Only)
Fax 612-235-5114

Wilmore Electronics
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Fax 408-778-0239

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Fax 213-404-1210

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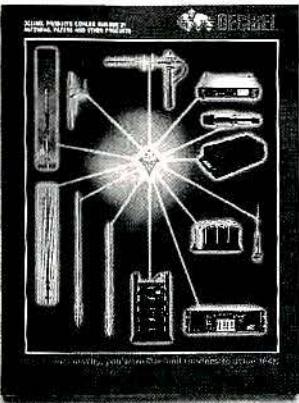
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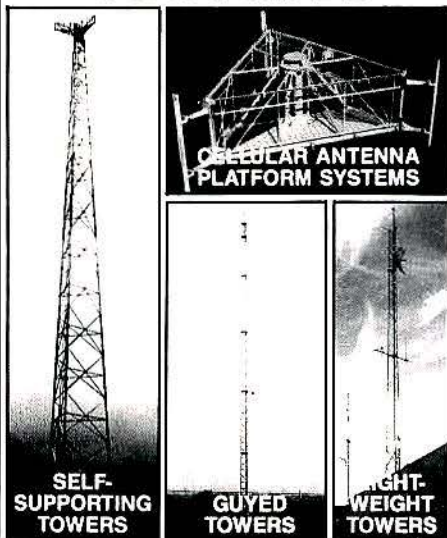
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BUYERS' GUIDE

3RD annual

FCC Offices Directory

Interference complaints

Write or call the nearest FCC field office. For the address and phone number of the field office nearest you, write or call the FCC Consumer Assistance Office and Small Business Division, 1919 M St. NW, Washington, DC 20554; 202-632-7000.

Office of Plans and Policy

John Haring, chief .. 202-653-5940
Thomas Spavins,
deputy chief 202-653-5940

Office of Engineering and Technology

Thomas P. Stanley,
chief engineer 202-632-7060
Bruce A. France, deputy
chief engineer 202-632-7060

Common Carrier Bureau

Richard M. Firestone,
chief 202-632-6980
Mobile Services Division
Gregory J. Vogt,
chief 202-632-6400
Myron C. Peck,
deputy chief 202-632-6400
Legal Branch
Abraham A. Leib,
chief 202-632-6450
Public Mobile Radio Branch

James H. Bennett,

chief 202-653-5560
Public Reference and Information Branch

Maria A. Ringold,

chief 202-254-6810
Cellular Radio Branch
Steve Markendorff,
chief 202-653-5560

Private Radio Bureau

Ralph A. Haller,
chief 202-632-6940
Beverly Baker,
deputy chief 202-632-6942
Land Mobile and Microwave Division
Richard J. Shiben,
chief 202-632-7597
Edward Jacobs,
deputy chief 202-632-7597
Rules Branch
F. Ronald Netro,
chief 202-634-2443
Rosalyn Allen,
deputy chief 202-634-2443
Compliance Branch
Carol Fox Foelack,
chief 202-632-7125
Licensing Division
Gary L. Stanford,
chief 717-337-1212
W. Riley Hollingsworth,
deputy chief 717-337-1212
Land Mobile Branch
Terry L. Fishel, chief .. 717-337-1411

BUYERS' GUIDE



Trade Associations Directory

American Association of State Highways and Transportation Officials
444 N. Capitol St. NW
Suite 225
Washington, DC 20001
202-624-5800
Francis B. Francois, executive director

American SMR Network Association (ASNA)
1835 K St. NW
Suite 203
Washington, DC 20006
202-331-7773
Russel Fox, executive director

Associated Public-Safety Communications Officers (APCO)
P.O. Box 699
New Smyrna Beach, FL 32170
800-824-1850
Robert E. Tall, executive director

Association of American Railroads (AAR)
50 F St. NW
Washington, DC 20001
800-826-4662
L.M. Himmel Sr., executive director

Canadian Radio Common Carriers Association (CRCCA)
1155 Young St.
Sixth Floor
Toronto, Ontario, Canada M4T 1W7
416-483-5176
Laura LaPrairie, executive director

Cellular Telecommunications Industry Association (CTIA)
1990 M St. NW
Suite 610
Washington, DC 20036
202-785-0081
Robert Maher, president

Communications Marketing Association (CMA)
1155 Terra Bella Ave.

Mountain View, CA 94043
415-968-4400
Ray Collins, president

Energy Telecommunications and Electrical Association (ENTELEC)
P.O. Box 795038
Dallas, TX 75379-5038
214-235-0655
Martha Fike, executive director

Forest Industries Telecommunications (FIT)
871 Country Club Road
Suite A
Eugene, OR 97401-2200
503-485-8441
Jim Baker, executive vice president

Forestry-Conservation Communications Association
P.O. Box 3392
Charlottesville, VA 22903
804-973-4596
Jim Capony, secretary-treasurer

International Association of Chiefs of Police (IACP)
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Suite 200
Arlington, VA 22201
703-243-6500
Dan Rosenblatt, executive director

International Association of Fire Chiefs (IAFC)
1329 18th St. NW
Washington, DC 20036
800-635-3473
Jim Esteep, president

International Taxicab Association
3849 Farragut Ave.
Kensington, MD 20895
301-946-5702
Alfred LaGasse, executive vice president

Land Mobile Communications Council
1150 17th St. NW

Suite 1000
Washington, DC 20036
202-956-5600
William T. Gerrard, president

National Association of Business and Educational Radio (NABER)
1501 Duke St.
Suite 200
Alexandria, VA 22314
800-759-0300
E.B. "Jay" Kitchen, president

National Association of Radio and Telecommunications Engineers (NARTE)
P.O. Box 15029
Salem, OR 97309
503-581-3336
John Holmberg, executive director

Radio Club of America
324 S. Third Ave.
Highland Park, NJ 08904
201-246-7271
Fred M. Link, president

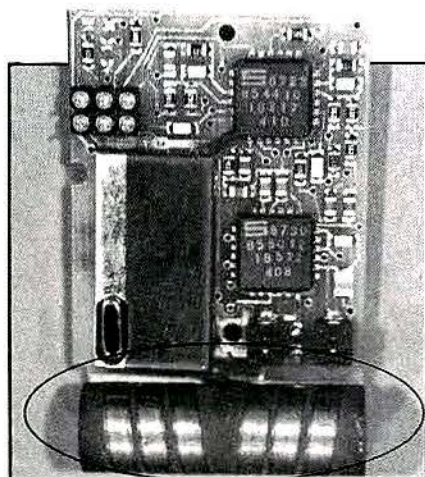
Special Industrial Radio Service Association (SIRSA)
1110 N. Glebe Road
Suite 500
Arlington, VA 22201
703-528-5115
Mark E. Crosby, president

Telocator
2000 M St. NW
Suite 230
Washington, DC 20036
800-422-4862
William Hotes, president

Utilities Telecommunications Council (UTC)
1620 Eye St. NW
Suite 515
Washington, DC 20006
202-872-0030
Mike Meehan, executive director



Future technology unfolds at Telocator convention



Silcom's direct conversion pager boasts an antenna that resists detuning by the body.

By Don Bishop
Editorial Director

Conventioners at Telocator's 41st Annual Convention & Exposition were treated to educational sessions, exhibits, and a gala reception. Telocator is a trade association that represents common carriers that offer paging and mobile telephone service.

Richard Sherwin, chief operating officer of Graphic Scanning, took the helm from American Skycell's John Scarpa as Telocator's new chairman. Scarpa said he is pleased with the new leadership at the FCC, in which he sees "a resurgence, a vibrancy."

Sherwin agreed: "Our relationship with the FCC has been excellent. We can talk with them about the issues of the day."

The new chairman spelled out three objectives for Telocator.

"First, we are an enlightened self-interest group. We want to increase the value of our businesses.

"Second, we are interested in the drug situation. McCaw and Graphic Scanning contributed extra to place brochures with the major law enforcement agencies.

"Third, the United States no longer is a leader in telecommunications, a fact that is of concern to the Telocator board. We ought to be the technology leader

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Sherwin



Russell

- **Silcom**—Direct conversion paging receiver technology combines with an antenna that resists detuning by the body in a pager made by Silcom.

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Gala reception

Capitol Hill's Union Station accommodated a gala opening reception sponsored by Bell Atlantic and NovAtel. SCE

provided shuttle service. As many as 2,000 people attended the reception.

Part of the reception was devoted to an 85th birthday anniversary celebration for Fred M. Link, the "father of two-way mobile radio." In honor of Link, his industry colleagues donated thousands of dollars to the Telocator Science and Education Foundation in his name.



and experiment with new technologies."

A view of telecommunications for the next decade and the beginning of the 21st Century came from Jesse E. Russell, director of the cellular telecommunications laboratory at AT&T Bell Laboratories.

Russell told a session audience that today's radio communications technologies will be perceived as terminals for the telephone network of the future. Radiopaging, cordless telephone and cellular telephone technology will converge into a personal communication network (PCN).

One of the key platforms for the PCN of the future is microcellular technology, cell sites with coverages extending only as far as 500 feet to 2,000 feet. "Lying on top of this network will be the integrated voice and data services," Russell said. Separate radiopaging systems would be supplanted by the network, for the most part, an ominous prospect for a large number of Telocator's members.

Equipment, services

Radiopaging equipment manufacturers and service providers brought plenty to see.

- **Commonwealth Communications Industries**—The Meridian series of paging terminals extends Commonwealth's Mark terminal line to include the largest paging systems.

Circle (400) on Fast Fact Card

- **Ericsson**—Subscribers to McCaw and several other paging services are using a new VHF RPC1 (formerly POCSAG) pager introduced by Ericsson.

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- **Synerdata**—Spawned by Cue Paging, Synerdata offers technology to allow one-stroke entries for sending alphanumeric messages over any Touch-Tone telephone.

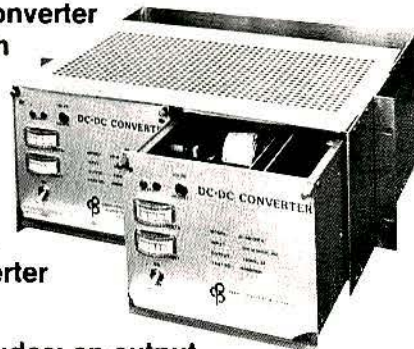
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Commander DMF-3000

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P eople



Kese



Simia



Hodgson



Tompson

John V. Kese, general manager of marketing for GE Consumer Electronics Business, advances to general manager of Lynchburg, VA-based GE Mobile Communications division.

Ardell Simia joins TPL Communication and DX Radio Systems, Los Angeles, as sales coordinator. She leaves Celltronics, San Diego, as RF Industries division account manager.

Promotions at Midland LMR, Kansas City, MO: **Ryan Hodgson** advances to product coordinator; **Mike Bland** moves to customer service manager.

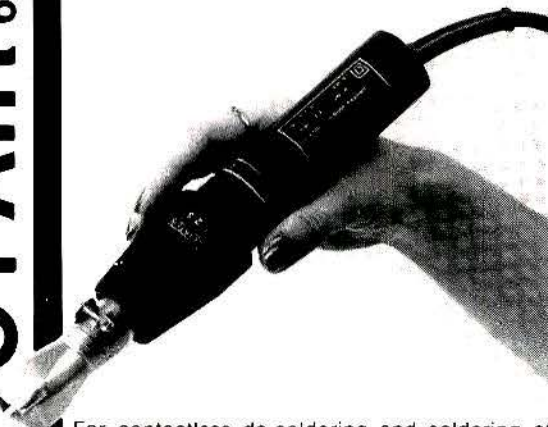
Jay S. Tompson becomes regional sales manager of Max-on Electronics, Kansas City, MO, leaving a systems consultant post at Communications Associates in Springfield, MO.



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1990

January

29-30—American SMR Network Association Winter Meeting and Exposition, Hyatt San Antonio, San Antonio, TX. Contact: 202-331-7773.

February

5-7—Cellular Telecommunications Industry Association 1990 Winter Meeting and Exposition, Ballys, Reno, NV. Contact: 202-785-0081.

March

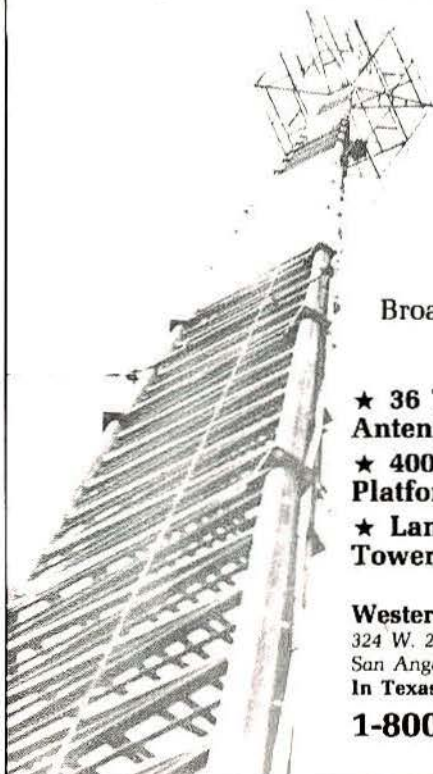
11-14—Energy Telecommunications and Electrical Association '90, San Antonio Convention Center and Hilton and Marriott hotels, San Antonio, TX. Contact: 214-578-1900.

22-24—Telocator Spring International Convention, San Diego Convention Center, San Diego, CA. Contact: 202-467-4781.

28-30—International Mobile Communications Expo, Dallas Convention Center, Dallas. Contact: 303-220-0600.



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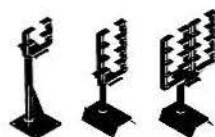
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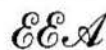
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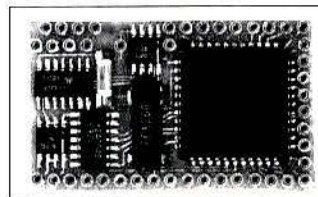
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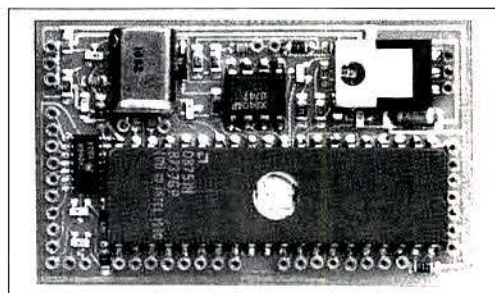
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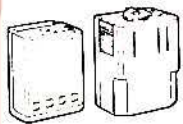
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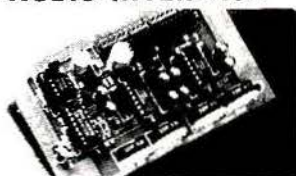
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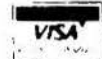
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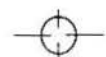
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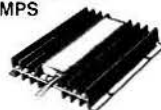
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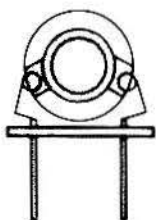
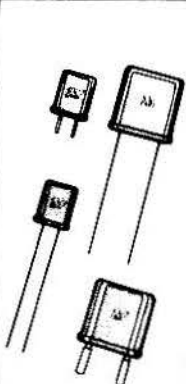
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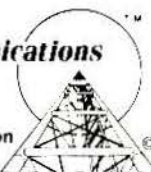
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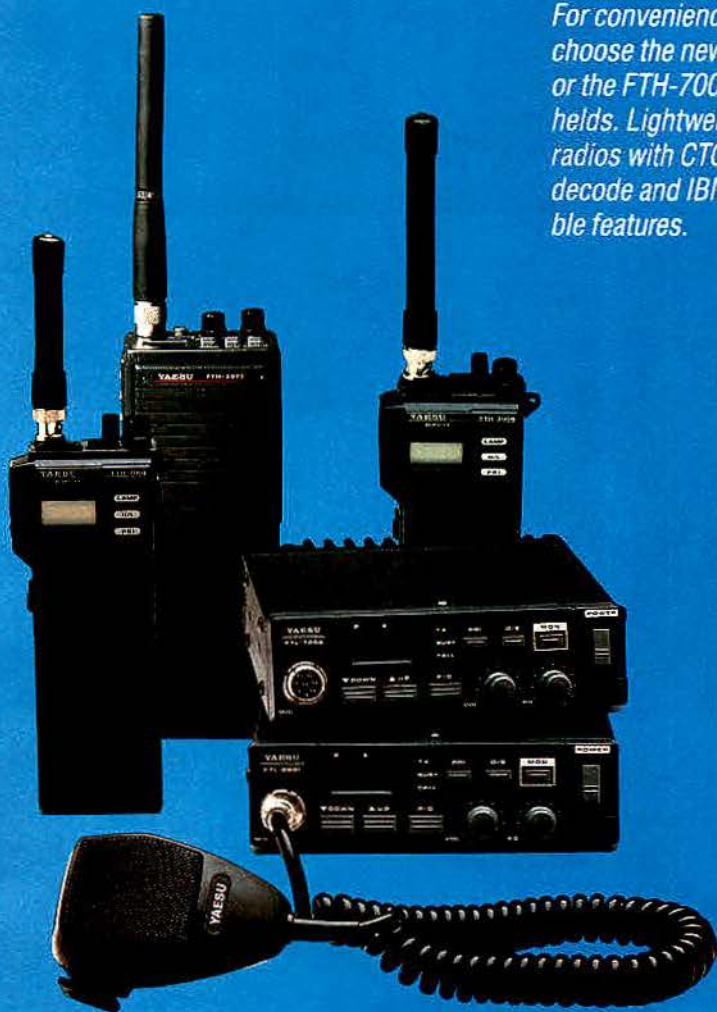
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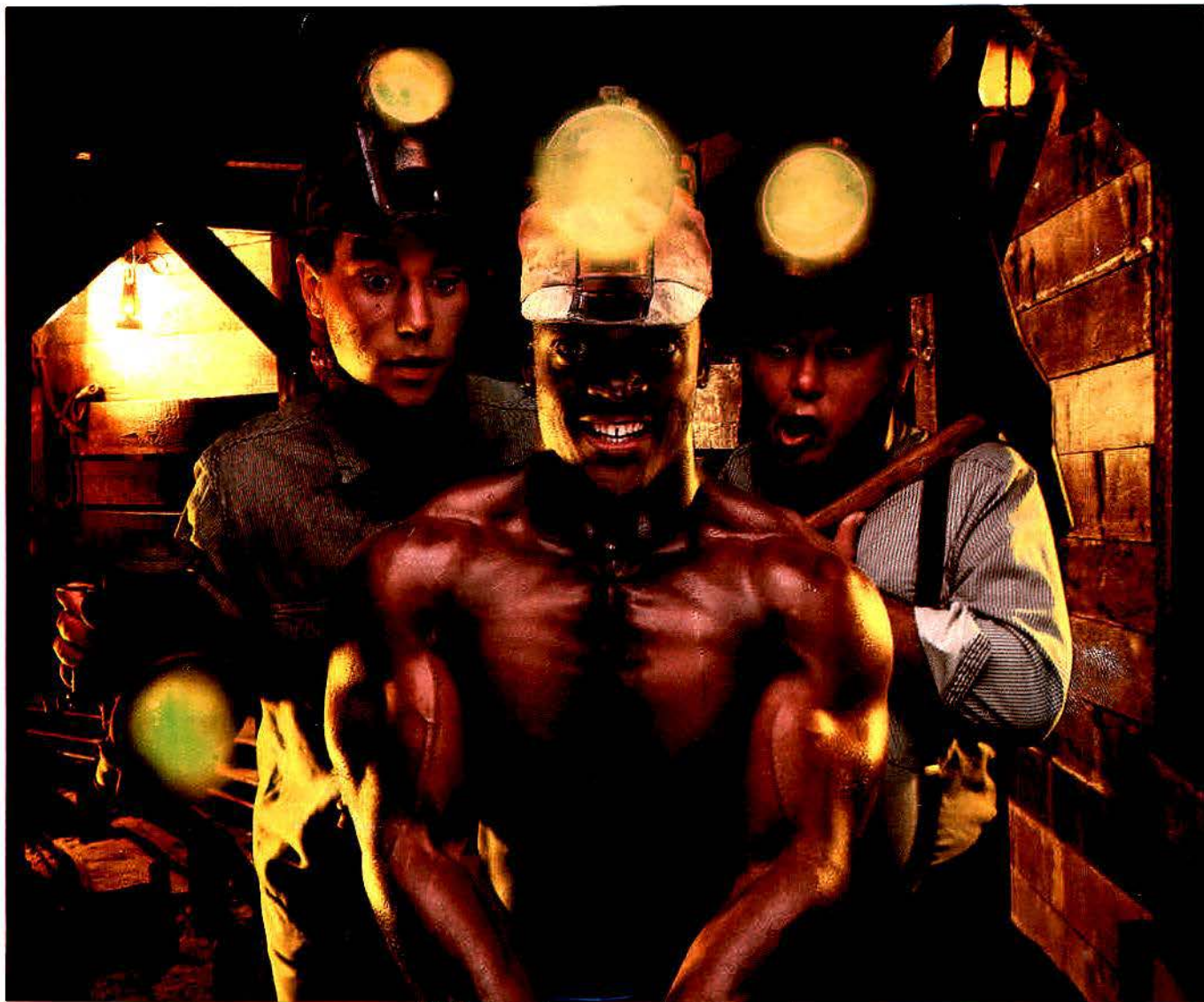
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